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Volume VI Number 2
April - June 1955

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Helena, Montana
July 15, 1955

Regional Director
Fish and Wildlife Service
P. O. Box 3737
Portland 8, Oregon

Dear Sir:

We are herewith submitting completion reports in connection with the projects carried out through use of Federal Aid in Wildlife Restoration funds.

The coverage is for the period from July 1, 1954 to April 30, 1955.

Submitted by:



Robert F. Cooney, Coordinator
Wildlife Restoration Division

Approved by:



A. A. O'Claire
State Fish and Game Director



REPORTS FOR THE
W I L D L I F E R E S T O R A T I O N D I V I S I O N
STATE OF MONTANA

FISH AND GAME COMMISSION

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- A. A. O'Claire

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- W. J. Everin

Coordinator, Wildlife Restoration Division

- R. F. Cooney

Volume VI Number 2

April - June 1955



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ABSTRACT

Antelope

The antelope populations in District Three are becoming stabilized and land-owner tolerance lessened by allowing uniform harvests by permittees.

Bear

Population is low, providing little hunting.

Deer

Hunter's choice harvests and mild winters have effected a better distribution pattern of deer and lessened winter losses. Many deer populations have increased above the carrying capacity of browse ranges and the animals have taken to open type ranges at low elevations making forbes and lesser growth type browse plants their principle forage. For this reason there is increasing antagonism with private landowners. In some areas adequate harvests have not been made due to availability of hunters.

Elk

Due to the increased popularity of this species and the many open type ranges, this specie presents many management problems. Most populations are within carrying capacities of the range they inhabit. Sustained harvests may best be accomplished by issuing permits in some localities to maintain annual uniform harvests.

Goats

An unexpectedly rapid rate of increase of mountain goats in the Crazy Mountains has the population past the point where hunting is a true sport. This is particularly true at the opening of the season when all permittees surge into this small area at once and drive the goats onto high precipitous slopes where they cannot be retrieved if shot or fall and ruin the head as a trophy. There is an urgent need to trap as many of these goats as possible in addition to hunter harvest.

Other goats in the district haven't been studied closely enough yet to determine the effects of two years of hunting.

The transplanted goats in the Spanish Peaks Wild Area are making slow progress in becoming established.

Moose

Moose populations within the District appear to be increasing with hunting. Several areas should be surveyed to acquire more data.

Sheep

Several small bands are in a stable state. The Spanish Peaks harvest appears to be beneficial from several aspects. Several areas give all appearances of potential transplanting sites.

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Title of Project: Central Montana Big Game Surveys

Leader: J. E. Gaab

Job Completion Report

Investigations Project

Work Plan I

Job No. I-A

Title of Work Plan: Big Game Population and Range Studies

Title of Job: Antelope (Southern)

BEAVERHEAD RIVER AREA

1. Aerial Antelope Census

<u>Area</u>	<u>No.</u>
Sage Creek	404
Medicine Lodge	227
Lima Area	150
Blacktail	123
Point of Rocks	66
Sweet Water	61
Argenta Flats	57
East Bench & McHessor Creek	43
Horse Prairie	23
Frying Pan Basin	17
Centennial	<u>16</u>
Total	1,089

The antelope in the Sweet Water area have decreased greatly in the last three years. The range is in poor condition and is heavily used by domestic sheep.

Realizing the competition between sheep and antelope it seems likely that the range condition is probably a main factor in the smaller number of antelope in this area.

There are five times as many antelope in the Medicine Lodge area this year then there were last year. The increase in number can be attributed to the migration of antelope from Idaho into Medicine Lodge through Sheep Creek Basin.

2. Aerial Elk Census in the Lima Hills

<u>Area</u>	<u>No.</u>
Spring Creek	141
Sawmill Creek	112
Little Sheep Creek	14
Garr Canyon	4
Deep Creek	4
Birch Creek	2
Dutch Hollow	<u>2</u>
Total	279

Of the elk censused the age-sex ratio was as follows:

Cows and calves	90%
Bulls	10% (6% mature, 4% spikes)

3. Aerial Elk Census in Pioneer Range-Vipond Park Area

<u>Area</u>	<u>No.</u>
Cattle Gulch	231
Quartz Hill	27
Dyce Creek	14
Dutchman Mountain	<u>5</u>
Total	277

Of the elk censused the age-sex ratio was as follows:

Cows and calves	93%
Bulls	7% (5% mature, 2% spikes)

4. Eighteen elk were counted on McCartney Mountain.

5. Aerial Elk Census in Medicine Lodge

<u>Area</u>	<u>No.</u>
Keystone Gulch & Lake Canyon	49

Age-sex ratio of this group:

Cows and calves	78%
Bulls	22% (one spike)

6. Aerial Elk Census in Bloody Dick Area

<u>Area</u>	<u>No.</u>
Hamilton & East Peterson	120
Buffalo Creek	52
Watson Creek	<u>13</u>
Total	185

Submitted by:

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Name J. E. Gaab

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By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

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Investigations Project

Work Plan I

Job No. I-A

Title of Work Plan: Big Game Population and Range Studies

Title of Job: Antelope (Southern)

SAGE CREEK ANTELOPE MIGRATION STUDY

Of the 217 antelope trapped and tagged in Sage Creek Basin, Beaverhead County, in February of 1953, 22 tags have been returned. Fifteen of the tags were returned after the 1953 antelope season (see Vol. 5 No. 22). Seven were returned after the 1954 season.

The kill sites of the tagged animals were plotted on a map. The logical routes between the trap and the kill sites were established. These routes were also drawn in on the map. The map was brought up to date after the 1954 hunting season.

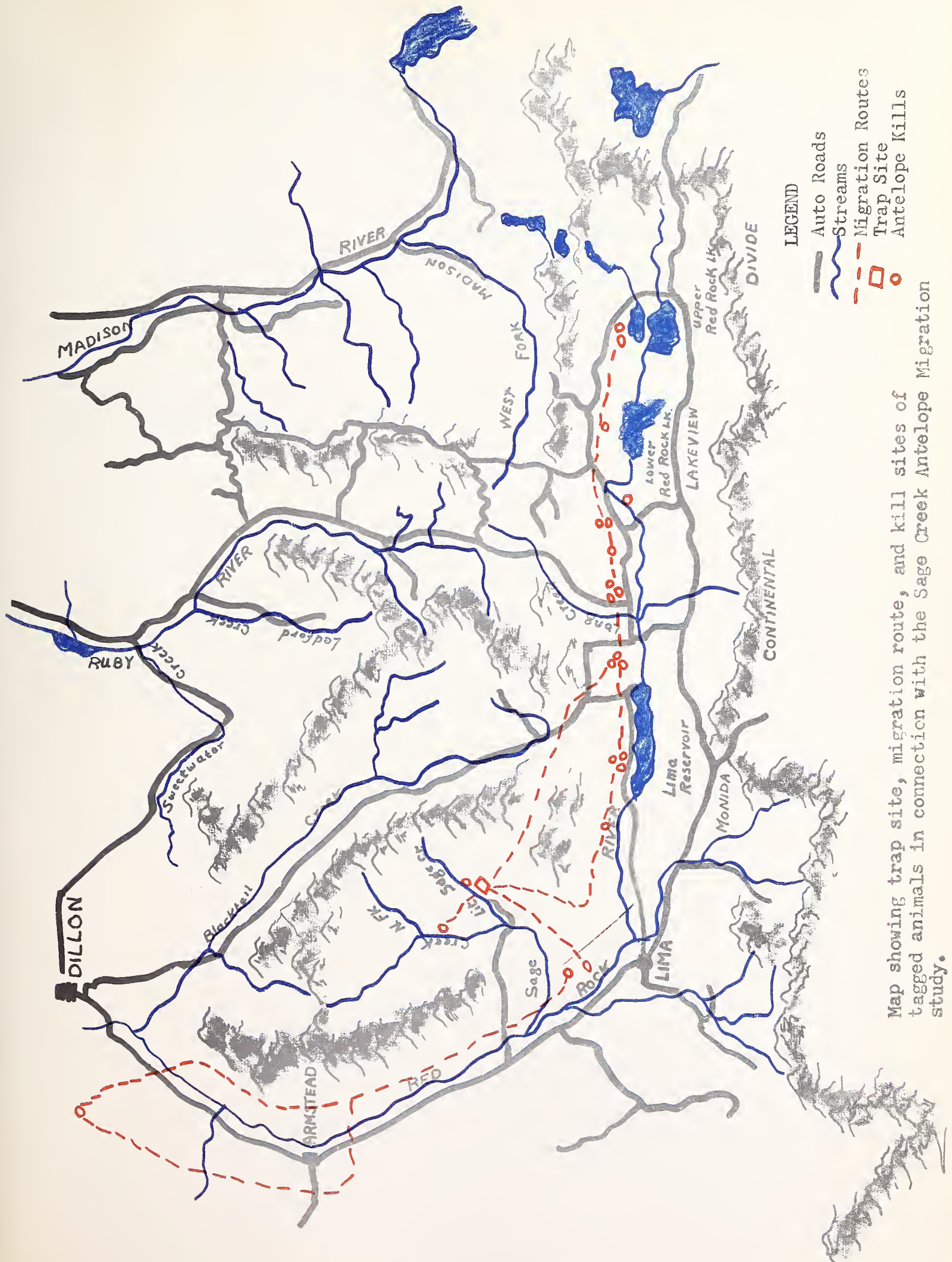
The migratory habits of this antelope herd can be summarized in this way:

Calculating from the aerial censuses conducted during the last three winters (1953, 1954 and 1955) from 73 per cent to 96 per cent of these antelope winter in Sage Creek Basin. Most of the remaining, winter in the hills near the mouth of Sage Creek or in the hills just north of Lima.

In the summer a few remain in Sage Creek (13 per cent of returns), but most of the herd migrate into the Centennial Valley. Sixteen tags (73 per cent of the tag returns) were from kills made in the Centennial. However, some of the animals remain in the hills or along the Red Rock River north of Lima (14 per cent of tag returns).

One return was from a kill made on the Argenta Flats. This animal was an old buck in poor condition. He had migrated in a direction opposite to the other antelope from which tags were taken (see map).

Sixteen antelope were stranded on a ridge in the North-Central portion of the Centennial during the winter of 1954-1955. The surrounding snow was



Map showing trap site, migration route, and kill sites of tagged animals in connection with the Sage Creek Antelope Migration study.

too deep to permit them to travel. They could not be found after the last heavy snows this spring. It is presumed that they starved.

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Job Completion Report

Investigations Project

Work Plan I

Job No. I-B

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Bear (Southern)

No work was done for this area on bear during this reporting period.

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Investigations Project

Work Plan I

Job No. I-D

Title of Work Plan: Big Game Population and Range Studies

Title of Job: Deer (Southern)

DEER SURVEY IN RUBY AREA

An aerial check of the distribution of deer in the Ruby area was made after the first heavy snowfall in April.

The main concentration of deer were on the east side of the Ruby River between Timber Creek and Barten Gulch. There were, however, noticeable concentrations of deer west of the river opposite the area mentioned.

The aerial check was followed by a ground survey. The following is a tabulation of the findings:

Utilization of Browse Species

Mountain Mahogany	- 100% of available shoots
Mountain Juniper	- 100% of available branch tips and leaves (some juniper not touched, probably because of palatability)
Big Sage	- use varied from light to heavy
Limber Pine	- some use on smaller trees

Condition of Deer

Three dead deer were checked. The marrow of the femur was examined to check for starvation.

Deer No. 1 (mature doe)

The marrow denoted starvation. Blood on the snow and tracks indicated that this deer had recently been killed by an

eagle. Tracks showing where the deer had fallen down and slid down a snow bank suggested that she was in a weakened condition. Eagle tracks near the carcass and blood on the snow in two different locations indicated that the eagle had attacked her while she was still alive.

Deer No. 2 (young-sex?)

Marrow denoted starvation.

Deer No. 3 (young-sex?)

Marrow solid, evidently a road kill.

Observations of groups of deer along the roads and lower foothills indicated that they were only in fair condition. They seemed reluctant to jump fences and when they ran they did so without the usual springy bounce one associates with the running gait of a mule deer.

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Job Completion Report

Investigations Project

Work Plan I

Job No. I-D

Title of Work Plan: Big Game Population and Range Studies

Title of Job: Deer (Southern)

RUBY DEER HERD - 1954 HARVEST OCTOBER 15 THROUGH DECEMBER 31

The Ruby checking station checked out 360 deer during the hunting season.

Adult ♂	Adult ♀	Young ♂	Young ♀	Yearling ♂ Spikes	Total
175	91	36	29	29	360

Twenty-two per cent of the hunters in the Ruby area were successful in getting a deer in 1954 as compared to 36 per cent of successful hunters in 1953. The 1954 season was longer than the 1953 season by a margin of 20 days either sex. Even with the longer season there were 26 per cent less hunters in the area in 1954 than in 1953. The kill, 360 animals, was only 44 per cent of the 1953 kill of 813 animals. There was very little hunting pressure during the month of December. The early part of the winter was open, not much snow, and the deer remained high and on their summer range until late in the season.

The harvest was inadequate to reduce the deer to the carrying capacity of the range and there was some starvation again this spring despite an open winter.

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Job Completion Report

Investigations Project

Work Plan I

Job No. I-E

Title of Work Plan: Big Game Population and Range Studies

Title of Job: Elk (Southern)

BLACKTAIL AREA

An aerial elk census was conducted along the Blacktail Ridge and in the Snow Crest Mountains. The census was conducted on February 20 and a recheck was made after a heavy snowfall in the first part of April.

The census, listed by areas, is as follows:

Middle Fork of Blacktail	328
Robb Creek-Ledford Creek	272
Long Creek-West Creek	159
South of Patch-Top Mt.	138
Blacktail Ridge	110
East Fork of Blacktail	42
West Fork of Blacktail	29
Clarks Canyon	<u>11</u>
Total	1,089

Elk in the Long Creek-West Creek area and those in the Patch-Top Mountain area were included in this census because they are considered to be part of the same group of animals that comprise the Ruby-Blacktail herd.

Age-sex Ratio of Animals Censused

16% bulls (8% mature - 8% spikes)
84% cows and calves

The 1954 census figure for the same area was 1,239.

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Investigations Project

Work Plan I

Job No. I-E

Title of Work Plan: Big Game Population and Range Studies

Title of Job: Elk (Southern)

BLACKTAIL-RUBY ELK HERD 1954 HARVEST

Checking station data on elk checked out through the Blacktail, Clover Creek and Ruby checking stations is as follows:

Checking Station	Adult ♂	Adult ♀	Young ♂	Young ♀	Spikes	Total
Blacktail	16	52	6	15	11	100
Clover Creek		14	3	2	2	21
Ruby	37	76	17	22	16	<u>168</u>
				Total		289

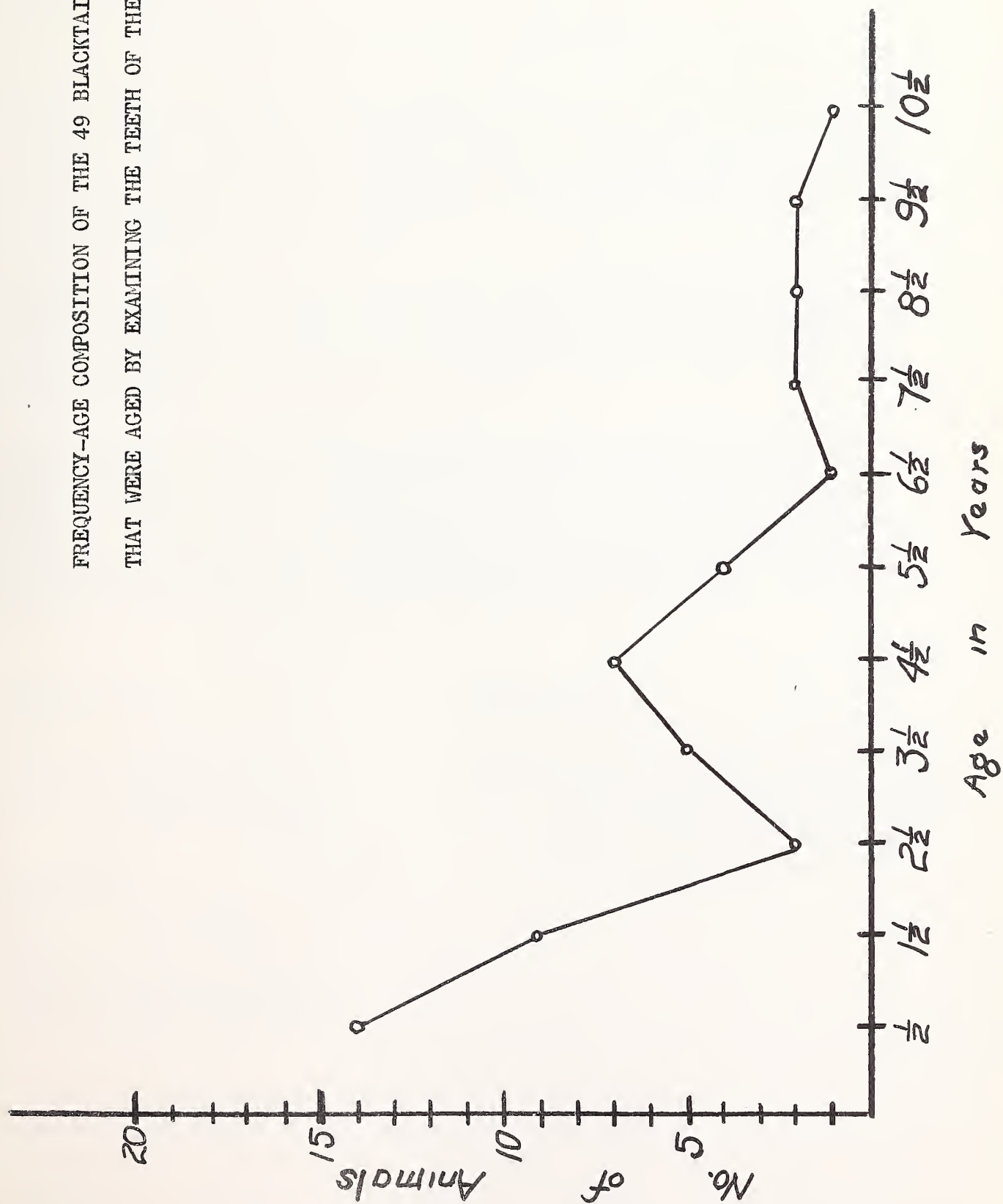
It is estimated that about another 50 animals were taken out of Clark's Canyon and Smallhorn Canyon on the west end of Blacktail Ridge. These animals would not pass through a checking station and so we can figure the total harvest at about 340 or 350 elk.

Using the Blacktail checking station data as a basis, 18 per cent of the hunters were successful in getting an elk.

Thirty-seven per cent of the elk harvested were males (18 per cent adult bulls, 10 per cent spikes, 9 per cent calves). Sixty-three per cent of the elk harvested were females (49 per cent cows and yearlings, 14 per cent calves).

Of the elk harvested 28 per cent could have been recognized from the air as bulls, however the sex ratio according to the aerial census this spring was

FREQUENCY-AGE COMPOSITION OF THE 49 BLACKTAIL-RUBY ELK
 THAT WERE AGED BY EXAMINING THE TEETH OF THE LOWER JAW.



16 per cent bulls (8 per cent mature, 8 per cent spikes) a difference of 12 per cent. This might indicate that a comparatively greater number of bulls were being missed on the spring census. Although the material at hand is not sufficient to make these percentage figures significant as far as specific figures go; when the bulls are considered separately and not as a part of the herd there is a difference of 75 per cent in the number of bulls according to the checking station figures as compared to the census figures.

According to the checking station data 23 per cent of the herd were calves.

Hunters in the Blacktail area during the 1954 season were asked to bring the lower jaws from the animals they killed out to one of the checking stations. The response was not too good but with the animals examined in the field by Fish and Game personnel and the jaws brought out by hunters, the teeth of 49 animals were examined. This was done to get an idea of the age composition of the herd.

The jaws were aged from memory. The personnel doing the aging had previously studied a jaw board composed of jaws which had been compared to those of a known age group. Because a good part of the aging was done in the field from memory there is a margin for error in the age groups above $3\frac{1}{2}$ years.

Age composition of the Blacktail-Ruby elk herd as figured from the 49 jaws examined, showed only two animals in the $2\frac{1}{2}$ year old group. It must be remembered that the group of animals that were aged comprised less than 17 per cent of the animals checked out through the checking stations. There was also a tendency on the part of the hunters to bring the calves and yearlings out whole while more of the larger animals were quartered in the field and the head left behind.

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Job Completion Report

Investigations Project

Work Plan I

Job No. I-E

Title of Work Plan: Big Game Population and Range Studies

Title of Job: Elk (Southern)

WISE RIVER - FLEECER AREA

Aerial Elk Census

<u>Area</u>	<u>No.</u>
Fleecer Mountain	389
(Charcoal to Willow Creek)	
Bull Creek	90
Jerry Creek to Steel Creek	66
Warm Springs Creek	48
Willow Creek	40
Sheep Creek	16
Butch Hill	14
Pine Creek	13
Fox Gulch	<u>5</u>
Total	681

Age-sex ratio of censused animals was as follows:

Cows and calves	91%
Bulls	9% (6% mature, 3% spikes)

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Investigations Project

Work Plan I

Job No. I-G

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Goats (Southern)

No work was done for this area on goats during this reporting period.

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Wildlife Restoration Division

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Job Completion Report

Investigations Project

Work Plan I

Job No. I-M

Title of Work Plan: Big Game Population and Range Studies

Title of Job: Moose (Southern)

MOOSE INVESTIGATION

1. An aerial moose census in the Upper Centennial Valley was flown in April.

The March census showed 22 moose with 19 of these on the Red Rock Lakes Refuge.

The April recheck showed 26 moose with 24 of these on the Refuge.

Less snow than usual and a fairly open winter resulted in less moose congregating on the Refuge. There seemed to be quite a bit of movement back and forth between the Willow Creek-bottoms and the Refuge.

2. An aerial moose census was conducted in Horse Prairie. Fifty moose were observed.
3. An aerial moose census was conducted in the Grasshopper drainage. Sixty-five moose were observed.

SUBMITTED BY:

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Wildlife Restoration Division

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Job Completion Report

Investigations Project

Work Plan I

Job No. I-S

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Sheep (Southern)

No work was done for this area on sheep during this reporting period.

SUBMITTED BY:

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Leader: J. E. Gaab

Job Completion Report

Investigations Project

Work Plan I

Job No. II-A

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Antelope (Northern)

DATES: January - April, 1955

No work was done on this job because the writer was not assigned to the project until January, when work on elk took precedence.

Submitted by:

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Name J. E. Gaab

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Wildlife Restoration Division

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Job Completion Report

Investigations Project

Work Plan I

Job No. II-B

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Bear (Northern)

Grizzly Bear Investigations - Continental Unit reported in
January - March, 1955 Quarterly, page 112, by Phillip B.
Marshall, Western Montana, Job I-D.

Submitted by:

Name Jack K. Saunders

Title Junior Biologist

Approved by:

Name J. E. Gaab

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-35-R-6
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Leader: J. E. Gaab

Job Completion Report

Investigations Project

Work Plan I

Job No. II-D

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Deer (Northern)

DATES: January - April, 1955

There were no quantitative observations made of deer numbers or range conditions because time was not available. Aerial flights and several ground trips in the area of winter range indicated that concentration areas which have been reported in the past were still being utilized (1/ Rognrud 1949). Considerable numbers of deer were present. Previous overuse of many browse species was evidenced by dead plants and the broomed and hedged appearance of others in the Lower Elk and Smith Creek areas.

Submitted by:

Name Jack K. Saunders

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Wildlife Restoration Division

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Leader: J. E. Gaab

Job Completion Report

Investigations Project

Work Plan I

Job No. II-E

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Elk (Northern)

CENSUS AND SURVEY OF ELK IN THE ADEL - HOUND CREEK AREA

DATES:

January to April, 1955

OBJECTIVES:

To determine the population and distribution of elk in the Adel-Hound Creek Area.

To determine the effectiveness of the permit season held in the area during the fall of 1954.

TECHNIQUES USED:

Aerial flights were made in the area during March, 1955 to locate and count the wintering concentrations of elk.

Questionnaire cards were sent to all the hunters receiving special permits allowing them to hunt in the area, and the return of these are analysed.

FINDINGS:

A tabulation of the elk count made during March, 1955 is given in Table I. The total count, 430, is about 100 animals more than were counted during the winter of 1954. There was a greater distribution of the elk this year than last year, possibly due to lighter snow conditions at the time of the count.

TABLE I

ELK COUNT OF ADEL-HOUND CREEK AREA, 1955

Hound Creek	49
Willow Creek - Elkhorn Creek	240
Wegner Creek - Stickney Creek	43
Rock Creek	<u>98</u>
Total	430

The elk season in this area during the fall of 1954 was handled on a special permit basis. This was done to accommodate ranchers of the area who felt that the number of hunters normally coming into the area during an open elk season were too great an inconvenience for them.

A total of 126 special permits were issued for the area in the fall of 1954. Of these, 67 were for either-sex and 59 were for bulls only. A tabulation of the returned questionnaire cards is given in Table II. A future report will deal with the variability of first card return, second card return and 100 per cent contact of the permittees.

TABLE II

RESULTS OF QUESTIONNAIRE CARD RETURN FOR THE 1954 HUNTING SEASON

	Either-Sex	Bulls	Total
No. of Cards Sent Out (100% sample)	67	59	126
Per Cent Return	81.7		
Per Cent Total Success	61.0		
Per Cent Success Either-Sex	74.07		
Per Cent Success Bulls Only		46.98	
Reported Kill from Cards	40	23	63
Calculated Kill	50	28	

CONCLUSIONS:

The hunter success in this area, as indicated by the first card returns, is slightly lower than that in the Highwood Mountains area east of Great Falls. A consideration may be that the Adel-Hound Creek area is larger and a larger part of it is difficult to hunt.

The summer and winter range of these elk is predominantly privately owned land. Therefore the size of the herd will probably depend on the number of elk which the ranchers will tolerate. At the present time they have indicated that they do not want more than 300 head wintering on their lands.

Submitted by:

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Wildlife Restoration Division

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Investigations Project

Work Plan I

Job No. II-E

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Elk (Northern)

CENSUS AND SURVEY OF ELK IN CONTINENTAL UNIT (EAST SLOPE)

DATES:

January to April, 1955

OBJECTIVES:

To determine the current population, distribution and annual increase of the elk in the area east of the Continental Divide including the drainages south from Two Medicine Creek to the Wolf Creek area near Highway 91.

TECHNIQUES USED:

Aerial flights were made in this area during February and March, 1955 to locate and count wintering concentrations of elk. These flights were made systematically by drainages. The entire area could not be covered in the period of one day, so units of area thought to contain herd groups were covered in as short a period of time as possible in order to reduce the error which might be caused by animal movement. Ground observations were made in an attempt to determine age ratios.

FINDINGS:

Aerial Surveys and Counts:

The flights made during February were made primarily to determine the distribution of the elk as influenced by the mild winter which was in progress at that time. This also served to familiarize the writer with the area as much of

it was new to him. The counts made at this time were not thought to be accurate as to total numbers, because large numbers, concentrated in timbered areas, and a wide distribution of the elk over higher winter range and lower fall range made them difficult to count.

During the middle and latter part of March, snow cover and depth in the higher country apparently caused a movement of the elk onto the game range acquisition and into lower, more open country. Counting conditions at this time were also better and a complete count was attempted.

The Counts:

A breakdown of the count conducted during March is given in Table I. Analysis of this count and comparison with that of March 1953 (Rognrud 1/) shows first of all an increase of about 300 elk in the area commonly thought to be the winter range of the Sun River elk herd. This may be attributed to movement from the South Fork of the Flathead or the Spotted Bear area. The heads of these drainages were closed during the hunting season in hopes of inducing elk from these areas to drift into the Sun River Game Preserve and on down the river to winter on the Sun River Game Range.

However, if the closure did not work as it was intended, then the 1954 harvest either did not take the increase or the increase was greater than previously suspected.

The area between Two Medicine Creek and the Teton River was not counted this year due to the lack of good flying days. The flyable days were utilized in an effort to obtain as good a count of the large herds (Sun River, Dearborn and Adel-Hound Creek areas) as possible.

Distribution:

The distribution of elk during the two counts is also quite different. More elk were found this year on the Sun River Game Range in Sun River Canyon and the North and South Forks of the North Fork of the Sun River. Fewer were found during March, 1955 in the Ford Creek-Upper Willow Creek area and the Cutrock-Elk Creek portion of the winter range than during 1954.

A significant increase in the numbers of elk in the Dearborn elk herd was found this year as compared to last year. The area south of Rogers Pass to Lyons Creek was not counted this year, but the comparison is not greatly affected because only two were found there last year.

1/ Rognrud, Big Game Survey in Areas Lying East of the Continental Divide and Including the Sun River, Dearborn, Canyon Creek, Teton-Badger Ranges. P-R Quarterly Report. Volume V, No. 2. 1954.

TABLE I

THE NUMBERS AND APPROXIMATE LOCATIONS WHERE
ELK WERE FOUND DURING THE 1954 AND 1955 ELK COUNTS

Census Unit	Numbers of Elk Counted	
	March 1954	March 1955
North of Sun River Outside the Canyon	87	73*
Sun River Canyon	163	309
North Fork	21	129
West Fork	29	1
South Fork	--	64
Ford Creek - Upper Willow Creek	331	256
Sun River Game Range	2312	2468
Cutrock - Elk Creek	<u>102</u>	<u>76</u>
Total	3045	3376
Harrison Basin - N. F. Dearborn - Rogers Pass Highway	336	419

* This area was counted only during February and the figure used was the only one available.

A comparison of the counts made in February and March, 1955 (Table II) shows that the elk were on higher ground during February, and were not as concentrated at that time. Fewer elk were counted in February probably due to the above factors.

Production:

An attempt was made to obtain a representative calf:adult ratio of the elk on the Sun River Game Range. A total of 891 elk were classified but many were repeats, and due to the practice of not disturbing the bands of elk on the range, a more representative sample was not obtained. It is felt that nearly all of the elk on the game range would

TABLE II

THE NUMBERS AND APPROXIMATE LOCATIONS OF ELK ON TWO SEPARATE
CENSUSES CONDUCTED DURING FEBRUARY AND MARCH, 1955

Census Units	Numbers of Elk Counted During	
	February 1955	March 1955
North of Sun River Outside the Canyon	73	73
Sun River Canyon	472	309
North Fork	139	129
West Fork	—	1
South Fork	62	64
Ford Creek - Upper Willow Creek	346	256
Sun River Game Range	1256	2468
Cutrock - Elk Creek	<u>22</u>	<u>76</u>
Total	2370	3376
Harrison Basin - N. F. Dearborn - Rogers Pass Highway	158	419

have to be classified in order to obtain an adequate sample because of the segregation of the mature bulls away from the cows, calves and spike bulls. The men employed at the game range also feel that there may be a segregation of the weaned calves away from the cows on the game range. The results of the classification of the small sample are found in Table III. A ratio of 14.23 calves: 100 adults was obtained. However, this figure cannot be given any more than passing interest, because (1) there is probably considerable repetition, (2) the bulls that are included may be part of a segregation which apply to either fewer or more cows than are included in the sample, (3) the same may be true of the calves.

RECOMMENDATIONS:

The recommendations for a kill were strongly affected by the opinion of local sportsmen at the time. In order to get a

TABLE III

THE SEX AND AGE CLASSIFICATION OF A SMALL SAMPLE OF
ELK ON THE SUN RIVER GAME RANGE

Bulls	Cows	Calves	Total
175	605	111	891

12.46% of the total elk were calves.

14.23% increase.

kill which may approach what a herd of this size potentially could produce, a kill of 500 either sex elk was recommended at the beginning of the season, and then the season would remain open on bulls until mid-February. This would also aid in holding elk on the Sun River Game Range.

It is recommended that more intensive work be carried out to determine (1) if the Sun River elk herd is actually a part of the Continental elk herd or a separate herd in itself, (2) the reproductive capacity of the herd, (3) its relationship to the carrying capacity of the range.

Submitted by:

Name Jack K. Saunders

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Approved by:

Name J. E. Gaab

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

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Leader: J. E. Gaab

Job Completion Report

Investigations Project

Work Plan I

Job No. II-E

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Elk (Northern)

ELK TRAPPING AND TAGGING IN THE SUN RIVER GAME RANGE

PERSONNEL:

Bob Neal, Assistant Game Range Manager
Jack K. Saunders, Junior Biologist

OBJECTIVES:

To trap elk and tag them with metal tags, and plastic markers for positive identification in movement studies, and to provide known age animals.

PROCEDURE & FINDINGS:

A portable live trap was used for capturing the animals. The trap is located on a ridge in a timbered area generally used by bulls. Locally raised wild hay was used for bait. Some of the hay was available outside the trap and this was thought to attract animals to the vicinity of the trap.

A large group of mature bulls moved into the vicinity of the trap in the latter part of January, and remained there during the greater part of the trapping season.

Table I contains the information on tag numbers used, sex and age of the animals trapped and tagged during 1955. All animals not designated "unknown" were aged by tooth replacement. A description of the tags, plastic markers and field data cards may be found in "Trapping and Tagging of Deer and Elk, Judith Game Range. 1955."

TABLE I

TAG NUMBERS, SEX AND AGE OF ELK TRAPPED AND TAGGED
AT THE SUN RIVER GAME RANGE

Date	Tag Numbers	Sex		Age
		Male	Female	
1955				
Jan. 24	F84 - F85		x	Unknown
25	F86 - F87		x	1/2
25	F89 - F90		x	2 1/2
25	F91 - F92		x	1/2
25	F93 - F94		x	1 1/2
25	F95 - F96		x	1 1/2
25	F97 - F98		x	1/2
25	F99 - F100		x	1/2
25	F102 - F104	x		1 1/2
Feb. 4	F106 - F107		x	Unknown
14	F108 - F109	x		Unknown
Mar. 3	F110 - F111	x		Unknown
6	F112 - F113	x		Unknown
6	F114 - F115	x		Unknown
6	F116 - F117	x		Unknown
10	F118 - F120	x		Unknown
10	F121 - F122	x		Unknown
12	H4051 - H4052	x		Mature
19	H4063 - H4064	x		Mature
Apr. 5	H4071 - H4072	x		Mature
5	H4067 - H4068	x		Mature
5	H4057 - H4058		x	Unknown
5	H4073 - H4074		x	Mature
11	H4059 - H4060		x	Mature
11	H4069 - H4070	x		1 1/2
11	H4083 - H4026		x	Mature
11	H4085 - H4086		x	Mature
15	H4075 - F2608	x		1/2
15	H4084 - F2610	x		Mature
16	H4087 - H4088		x	Mature
20	H4095 - H4096	x		Mature
20	H4091 - H4092	x		Mature
20	H4099 - H4100		x	Mature

Submitted by:

Name Jack K. Saunders

Title Junior Biologist

Approved by:

Name Bob Neal

Title Ass't Game Range Manager

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

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Job Completion Report

Investigations Project

Work Plan I

Job No. II-G

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Goats (Northern)

GOAT CENSUS - SUN RIVER AREA

DATES: January to April, 1955

FINDINGS:

Incidental to elk counting, 25 mountain goats were observed during aerial flights in February and March.

Feb. 18	7 adults 4 kids	Ridge west of No Business Creek
Mar. 15	3 adults 2 kids	Slate Goat Mountain
	3 adults	Head of Rock Creek
Mar. 16	3 adults 3 kids	Ridge between Mortimer and Blacktail Gulches

Submitted by:

Approved by:

Name Jack K. Saunders

Montana State Fish and Game Department

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Job Completion Report

Investigations Project

Work Plan I

Job No. II-M

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Moose (Northern)

DATES: January - April, 1955

This portion of the project was inactive due to the time of year when the writer was assigned to the project.

Submitted by:

Name Jack K. Saunders

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By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

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Job Completion Report

Investigations Project

Work Plan I

Job No. II-S

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Sheep (Northern)

BIGHORN SHEEP INVESTIGATIONS

DATES:

January to April, 1955

FINDINGS AND DISCUSSION:

Observations on sheep were made incidental to aerial flights and ground observations on elk.

Feb. 10	1 full-curl ram 4 unclassified	North of South Fork of Deep Creek at the mouth of the canyon.
Feb. 18	4 unclassified	North of Gibson Lake on ridge between Big George and Mortimer Gulches.
	2 rams	Mouth of Lange Creek.
	6 unclassified	West of South Fork, North end of Pretty Prairie.
	7 unclassified	Vicinity of Sun Butte
	2 rams	Head of French Gulch
	2 rams	Ridge between Norwegian and French Gulch.
Mar. 9	7 unclassified	Between Blacktail and Mortimer

Mar. 9	1 ewe	Wagner Basin
Mar. 15	3 rams (1-3/4; 2-1/2 curl)	North end of Black Reef
	8 unclassified	North end of Black Reef
	26 (6 rams)	South end of Sheep Reef
	3 rams	North end of Sheep Reef
	8 unclassified	East side of Arsenic Creek
	21 unclassified	Reclamation Flat

Time was not available for a complete sheep count. It is felt that an aerial count of the sheep in this area would be possible at less expense than the ground count. Perhaps, the two methods should be employed and compared during the coming year. It is possible that the aerial count could be made most effectively during the spring, after the snow has receded. At this time, the sheep are somewhat concentrated, and they have not lost their bleached pelage.

Submitted by:

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Name J. E. Gaab

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Job Completion Report

Investigations Project

Work Plan I

Job No. II-S

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Sheep (Northern)

SUN RIVER BIGHORN SHEEP CENSUS

DATE: December 2 - 5, 1954

PERSONNEL:

Dr. Helmut Buechner, Washington State College, Pullman Washington
Faye Couey
Merle Rognrud
Barney Marshall
Jack Rose
Phil South
Bob Neal
Dick Von Bergen
Norman Wortman
Dave Stonehouse
James Stradley, Pilot
J. E. Gaab

PURPOSE:

To make a complete census of the Sun River mountain sheep, and to gather as much information on sex, age and distribution as possible.

PROCEDURE:

The crew members were in six teams, two men together and each given a route of travel on foot or horseback for the two days of actual censusing. J. E. Gaab and James Stradley flew in a Piper Super-Cub to census areas too remote for the ground crew. Forest Service facilities at the Hannan Gulch Ranger Station were used as a headquarters. Forest Service officials were

consulted concerning routes of travel.

FINDINGS:

1. 261 sheep were censused.
2. 34 rams with about 3/4 horn curl or more were classified as legal rams to hunt the following hunting season.
3. 29.65 per cent herd increase determined by classification.
4. About 400 elk were on the state-owned game range at the time this census was made.
5. Thirty-nine bighorns were located by airplane in areas too remote to investigate on foot; several other areas were investigated by air where sheep were thought to be, but none were located.

Area	Legal Rams At Least 3/4 Curl	Small Rams Less than 3/4 Curl	Ewes and Yrlings	Lambs	Unclass- ified	Total
Wagner Basin	6	1	19	6		32
Hannan Gulch	2	1	4	2		9
Mortimer Gulch			1	1		2
Big George Creek	8	6	17	7		38
Scattering Springs	3	9	24	14		50
Reclamation Flat	10	7	32	16		65
Sun Butte B.M. 6968	1				12	13
Goat Creek	4	3	12	5		24
W. Fk. Licks			2			2
Willow Creek Ford Creek					26	26
Total	34	27	111	51	38	261

CONCLUSIONS:

1. An aerial census under ideal conditions is probably as

effective and more economical than crewmen on foot to obtain as close as possible a total sheep population.

2. The harvest of rams of 3/4 horn curl doesn't appear to have had any adverse affect on the sheep population.

RECOMMENDATIONS:

That the harvest be continued and close account be kept on the density of internal parasites.

Submitted by:

Name J. E. Gaab

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

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Job Completion Report

Investigations Project

Work Plan I

Job No. III-A

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Antelope (Eastern)

Whitehall Antelope Census, by James A. Rogers, Warden

- 66 - Point of Rocks
- 17 - Rochester Basin
- 6 - Seidenstickers
- 60 - S. W. Davis Ranch
- 28 - Mayflower - Bone Basin
- 30 - Fish Creek
- 11 - West Stevens Ranch, Whitetail Creek
- 19 - Cottonwood - Dunn Canyon Area
- 25 - Elkhorn Creek

Three Forks - Toston Antelope Census, by Norman Wortman,
Fieldman

- 63 - Lewis and Clark Cavern Area
- 67 - Nigger Holler
- 36 - Toston Flats
- 39 - Radersberg

Harrison Lake - Willow Creek Antelope Census, by Norman
Wortman, Fieldman

- 178 - Antelope

Upper Madison Census, by Norman Wortman, Fieldman

- 170 Antelope

These antelope originated from a transplant made on both sides of the river. This year all of the antelope seen were east of the river, presumably those on the west have crossed over on the river ice.

Submitted by:

Name J. E. Gaab

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Wildlife Restoration Division

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Job Completion Report

Investigations Project

Work Plan I

Job No. III-B

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Bear (Eastern)

Bear populations are generally low as determined from the number taken by hunters.

Submitted by:

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Job Completion Report

Investigations Project

Work Plan I

Job No. III-D

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Deer (Eastern)

The general aspect of deer populations within this segment is overpopulation. In preferred areas habitat depletion is going on. The last two winters have been rather open and light losses have occurred in deer populations, yet browse type habitat is being depleted beyond recovery in some areas. Deer are moving onto range land weed habitat to survive. The abundance of deer is detracting from a sport for the true woodsman.

Horseshoe Hills Big Game Closed Area

The north end of Gallatin County has been closed to deer hunting for years. All efforts by Department personnel to employ a deer harvest in recent years had been in vain until last fall. Landowners finally decided they weren't able to cope with the increased deer population and asked for a special season by permit holders. Four hundred and fifty permits were issued. After the season a questionnaire was sent to each permittee.

Results of questionnaire:

91.8% hunter success (Some permittees killed deer in other extended areas)

1 doe to 1.06 bucks - sex ratio of harvest

8.4% fawns of total harvest

38% of bucks were yearlings

West Gallatin Deer Harvest

Squaw Creek Checking Station:

Sixteen days bucks only, and sixteen days either-sex harvest-- 93 bucks, 20 does. Other deer hunter harvest information is in separate report of results of statewide questionnaire.

DEER RANGES AND POPULATIONS INVESTIGATED

Horseshoe Hills Big Game Closed Area:

This area is losing browse type habitat, such as bitterbrush, serviceberry, chokecherry and others.

Boulder River (Park County)

Deer are forced out of the mountains to winter in rather open range and along the river bottom on agricultural lands. Either sex harvest was discouraged for several years while these deer built up to proportions that caused considerable depredation to haystacks. An extended season was recommended following investigation. Some of those nuisance deer were removed and depredation minimized. Deer habitat is limited and adequately stocked.

The area between the Boulder and Stillwater Rivers in Upper and Lower Deer Creeks and Bridger Creeks is good deer habitat and from the distribution pattern exhibited during this past winter the population is approaching the eruption stage. A good portion of the area is not readily accessible by hunters.

The deer distribution in the Trout Creek area was investigated, but not found to be excessive from any standpoint.

Stillwater River

An inspection of this area indicated that the extended season is not cropping the deer adequately. It is just an opinion that hunters do not utilize this area because of accessibility of other areas. Severe wintering conditions would certainly cause heavy losses of particularly fawn deer. The extended area is recommended as a two deer per hunter season.

Rosebud River

Either-sex harvests have apparently kept these deer near carrying capacity.

West Side of Big Belt Mountains

This area is largely a problem of overused range and rancher tolerance.

East Side of Big Belt Mountains

There isn't a heavy population in this area except in the Little Birch Creek Area. The problem there isn't grave from a range standpoint, but a severe winter will make it unavailable and the deer will have to redistribute or be lost.

Crazy Mountains

The west side of the Crazy Mountains do not have any important deer problems. The east side of the Crazy Mountains north to Sweetgrass Creek at present has a reduced deer population to near proper capacity. North of Sweetgrass Creek, American Fork of the Musselshell River and the Elk Creeks have an overabundance of deer that are forced to winter in open terrain and become ground feeders. A persisting snow crust some years will take a heavy toll in this area as it has in the past. Some deer fall prey to what may be considered a concentration of golden eagles.

Yellowstone River (Above Livingston)

This range has been covered quite thoroughly from the air and ground inspections. There appears to be an adequate population of deer along the Yellowstone River from Livingston to Yankee Jim Canyon. There haven't been any losses but some deer are in an emaciated state. There still appears to be an abundance of deer on the North Side above Yankee Jim Canyon. Deer are menacing private property, particularly small hay fields.

Madison River

Deer populations have been reduced somewhat by long either-sex seasons, but still concentrate in preferred areas where natural range is in a depleted state. Consequently, deer come to lower elevations on private land in the vicinity of hay fields.

Submitted by:

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Job Completion Report

Investigations Project

Work Plan I

Job No. III-E

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Elk (Eastern)

WEST GALLATIN ELK

Checking Station Data

One checking station was operated at Squaw Creek for the duration of the elk season, October 15, 1954 through January 18, 1955.

Elk Harvest Checked

Adult Males	Adult Females	Male Calves	Female Calves	Spikes	Total
98	252	62	69	49	530

In addition (Estimates) Leaving the area to the South - 30
 By-passed checking station - 10
 Remained in the area - 10
 Cripples - 30
 Total elk losses from the herd during open season -610

623 successful hunters harvested 664 game animals (all species)
 53 non-resident successful hunters from 16 states took 60 game animals
 32 counties in the State were represented by hunters
 72% of the successful hunters were residents of Gallatin County
 9% of the successful hunters were residents of Yellowstone County

Four most popular rifles used: 30:06, 270, 300 Savage and Magnum, and 30:30
 46% of rifles used were 30:06 calibre
 29% of rifles used were 270 calibre

As many elk as possible were aged that came through the checking station.

Ages	175 males	267 females	Total	442
Aged into Groups	<u>37 males</u>	<u>51 females</u>	Total	<u>88</u>
Total	212	318		530

83.45% of checked elk were aged closely

60.40% of the harvest were females

39.60% of the harvest were males.

64 % of the males were in the calf and yearling classes

35.4 % of the males were in the calf class

Only 63 branch antlered bulls out of 442 elk sexed and aged

1 branch antlered elk to 6 antlerless (plus spikes) elk

32 males ($4\frac{1}{2}$ years and older) trophy animals out of harvest
of 442

1 breeding bull ($2\frac{1}{2}$ yrs. and older) to 3.1 breeding cows
($1\frac{1}{2}$ years and older)

64% of yearlings were males

36% of yearlings were females

Average age of males is less than 1 year 8 months old.

Average age of females is about 3 years old.

A hunter preference was indicated for spike bull elk, but the sex ratio of harvest in the $3\frac{1}{2}$ year old class is higher among females which compensates so the sex ratio through the $3\frac{1}{2}$ year class is nearly equal. The mortality rate of males from the $4\frac{1}{2}$ year age class and older is greater than females. Mortality rate differential between sexes is to be studied further by aging all elk harvested from the West Gallatin drainage next fall.

Twenty-three "known age" elk heads were collected from animals killed this season that had been tagged as young calves in previous years.

Of the animals aged during this harvest, the males represented 344 years' use on the range as compared to 1,041 by females.

Elk Harvest by Drainage

Buffalohorn Creek	131
Taylor's Fork	83
Sage Creek	79
Tepee Creek	67
Elkhorn Creek	64
Porcupine Creek	24
Wapiti Creek	15
Wilson Gulch	13
Buck Creek	13

Elk Harvest by Drainage (Continued)

Beaver Creek	7
Cache Creek	6
West Fork	6
Cinnamon Creek	5
Squaw Creek	3
Deadhorse Creek	3
Doe Creek	3
Levinski Creek	2
Deer Creek	2
Yellow Mule Creeks	2
Dudley Creek	1
Swan Creek	<u>1</u>
Total	530

The harvest from October 15th through December 19, 1954 of 72 elk are considered from native groups and not from the Yellowstone Park migrating elk.

West Gallatin Winter Aerial Elk Census (Date February 4, 1955)

Porcupine Creek	64
Elkhorn Creek	72
Buffalohorn Creek	220
Wilson Gulch	111
Tepee Creek	785
Daly Creek	196
Lodgepole Creek	49
Sawmill Gulch	39
Black Butte Creek	95
Monument Creek	66
Wickiup Creek	22
Specimen Creek	18
Fan Creek	5
Sage Creek	6
Wapiti Creek	73
Meadow Creek	12
Castle Rock	3
Deer Creek	4
Levinski Creek	1
Mouth Spanish Creek	<u>1</u>
Total	1,842

Very few, if any elk, migrated from the Gallatin into the Madison this past winter. The winter distribution pattern was smaller than usual. Very few elk migrated along the east side of the river to Porcupine Creek, consequently the state-owned game range didn't receive the usual amount of use. No tracks

were seen on the Porcupine Creek game range until March, then only very few. The use of the Taylor Fork range was much lighter than usual. Winter losses up until the time this report was written have been negligible.

Elk Distribution and Range Condition Investigations of West Gal- latin

A summer distribution pattern of elk along the Yellowstone - Galatin Divide was investigated. It was found that the usual numbers of elk summer near the head of Big Creek in an area set aside by the Forest Service excluding domestic sheep. Competition was indicated in the Onion Basin area. The elk summer in this basin until the domestic sheep graze it.

Incidental to a sheep and goat investigation it was discovered that a sizeable group of elk were summering in the head of Jack Creek and Beehive Basin which may explain the lack of elk summering in the Yellow Mule Creeks.

Big Belt Mountains Elk

Several inspections were made in the Dry Creek area--one from the air and two on the ground. The area was not included in the recommended hunting area until a group of elk moved in on private land. The area was recommended to be included in the open season. A horseback inspection in Little Birch Creek was made to locate elk summering area. This area was included in an open hunting area. One group of elk that were harvested in this area composed of 35 males and 4 females. Some trophy males were collected--two seven-point and one eight-point (one side).

The harvest was quite heavy throughout the south end of the Big Belt Mountains. The last year's increase and about one half the original herd were taken, leaving about 150 elk counted this winter.

Bridger Mountains Elk

The Bang-tail Ridge area was investigated as a possible transplanting site on a "put and take" basis. The recommendation was made for a small number. The elk originating from a previous plant on the north end of the Bridgers were not censused this year. However, it is reported that fifty-odd elk wintered on Horse Mountain this winter.

Crow Creek Elk (Radersberg)

An aerial census indicated the presence of 242 elk. It is recommended that this area be hunted for branch-antlered bulls and a special season for 50 either-sex by permit holders be allowed.

Bull Mountain-Whitetail Creek Elk

Two aerial census were made--one covering the entire area and the second just Bull Mountain.

The complete census:

Scattered along east side of Bull Mountain	18
Long Park	13
Houghton Park	36
Head of Whitetail on Bull Mtn. slope	<u>104</u>
Total for Bull Mountain proper - - - - -	171
Bigfoot area	77
Ratio Mountain	95
Pony Creek	36
Whitetail Ridge	<u>9</u>
Total for Whitetail-Bigfoot area - - - - -	217

Later 190 elk were counted on Bull Mountain proper, the maximum number during the wintering period. The 77 elk in the Bigfoot area are probably elk that summer in the Little Boulder-Galena Gulch area.

Prickly Pear and Ten-Mile Creek Elk

Aerial Census by Faye Couey and Jeff Greene, Helena District Ranger. The area is from Helena along Continental Divide to Rogers Pass, March 26, 1955.

Deadman Creek	9
Marysville	18
North Fork of Beartrap	12
McQuitty Gulch (Cayuse Ridge)	22 and 24
Granite Lookout (17 on Lincoln Side)	11
Gravelly Range Lake	44
Stemple Pass	11
Sheep Creek	150
Black Mountain	4
Colorado Gulch	2
Grizzly Gulch	<u>7</u>
Total	314

Include count from Lump Gulch to Bernice, from Eckerson. (About 60 head in Carlson's area seen by Howard Larsen.)

Big Hole Elk

The entire wintering area for the Big Hole elk herd includes the Big Hole Basin and Canyon Creek (Vipond Park), and Charcoal

Basin to the Mill Creek road (Anaconda).

Pine Creek	13
Butch Hill	14
Bull Creek	80
Warm Spring Creek	48
Fox Gulch	5
Sheep Creek	16
Steele Creek	9
Dolittle Creek (after 31 were trapped)	2
Squaw Creek	16
Toomey Creek	14
Walker Creek	6
Seymour Creek	23
Jerry Creek	<u>5</u>

Total Big Hole Basin 251

Vipond Park	228
Quartz Hill	<u>29</u>

Total Canyon Creek Area 257

Charcoal Creek	82
Divide Creek	35
Crazy Swede Creek	30
Sunday Gulch	15
Norton Creek	154
Beef Straight Creek	84
Willow Creek (Taken from flight by Rognrud March 25th)	<u>47</u>

Total 447

Total Big Hole Elk Herd 955

The total harvest as determined from two checking stations plus information gathered by Deputy Game Warden and Forest Officers was 241 elk.

Madison Elk

The native elk on the east side of the Madison River were censused by air February 11, 1955. There was no appreciable migration from the Gallatin to the Madison this winter.

Jordain Creek	4
Cedar Creek	30
Mill & Tollman Creeks	34
Bear Creek	15
Indian Creek	6
South Indian Creek	26
Corral Creek	3

Deer Creek	39
Moose Creek	<u>4</u>

Total east side Madison River	161
-------------------------------	-----

These elk were sexed from the air and the number of male calves calculated indicated a sex ratio of 1:1. Fourteen bull elk reported on Shedhorn Mountain would bring the total to 175 elk with a greater male sex ratio. These bulls are probably from the Gallatin elk herd.

West Side of the Madison River

Cliff Lake Bench	5
West Fork Madison	36
Elk Lake	10
Bobcat Creek	26
North Wigwam Creek	64
South Wigwam Creek	21
South Wigwam Creek	45
Bucks Nest	<u>16</u>
Total	223

Centennial Valley Elk

Two groups of elk were on the north side of the Centennial Valley; usually there is but one. It is felt that the other group usually migrate into the Blacktail area but due to the open winter there remained in Long Creek approximately 150 head. The other group in Metzel Creek was approximately 125 head.

Lower Yellowstone Elk

There has been reported 44 elk on Mission Creek.

The Paradise Valley was censused from the air and ground investigation.

Eight-mile Creek	2
Big Creek	52
West Big Creek	6
Tom Miner Creek (West Side)	13
Horse Creek	16
Mal-Heron Creek	11
Stan's Basin	12
Emmigrant Peak	20
Pine Creek	<u>Sign</u>
Total	132

There is a high percentage of these elk as bulls probably from

the Gallatin herd. The Big Creek elk winter range was inspected; all of the elk listed were seen from the ground wintering mostly from Cottonwood Creek to Bark Cabin Creek. This is a rather isolated area and perhaps some years these elk have to distribute to more open ridge type terrain. There is considerable evidence of overuse from past domestic sheep trailing. Juniper and fir trees are encroaching the grass types.. In later years if the elk population builds up, something will have to be done to redistribute the herd or erosion will be induced by heavy spring use.

Red Lodge Elk

One hundred and twelve elk were counted in this area preceeding a plant on a "put and take" basis to bring the wintering herd to 200 animals. This type of program is operating very well in this area. A longer hunting season allows for a more sporting hunt. Those elk that have been troublesome previously are reduced in numbers. The newly transplanted animals have a wider distribution pattern which extends the herd's range and the animals remain in smaller groups.

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Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

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PROJECT NO. W-35-R-6
DATE July 15, 1955
VOL. VI NO. 2

Title of Project: Central Montana Big Game Surveys

Leader: J. E. Gaab

Job Completion Report

Investigations Project

Work Plan I

Job No. III-G

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Goats (Eastern)

Crazy Mountains Goats

During the first week in April an aerial goat census was made of the Crazy Mountains. Sixteen hours flying time was required. Best possible conditions were had, following a complete fresh snow cover, and excellent air conditions without wind. Three hundred and twenty goats were observed, 90 of which were classified as kids. Twenty-seven goats were counted on Loco Mountain, an area not yet hunted. The distribution pattern indicated that the goats are tending to increase to the south on the east side of the mountains.

Recommendations for this fall harvest is for 100 special permits to be issued from September 15th through November 15th.

It is further recommended that goats be trapped from one established trap at Hindu Lake and that another trap be established on Milly Creek.

Salt was packed in by horse to the trap at Hindu Lake on July 7th. On July 17, 300 pounds of salt was flown into the Loco Mountain and Sunlight Mountain areas. The purpose was to attract more goats into the north end of the mountain range.

Three days at the opening of the hunting season were spent in the area. Some hunter congestion was apparent which forced goats into inaccessible terrain for a hunter who must bring an animal out. Non-resident hunting should be encouraged and guide and outfitter business solicited.

A goat skull from the Crazy Mountains herd was taken to the Veterinary Research Laboratory at Bozeman, Montana. There were several smooth, symmetrical holes through the bone below the base

of the horn. Several holes, smaller, were not all the way through the bone. No mechanical means was evident. It gave the appearance of typical screw-worm boring; however, to the knowledge of the staff at the laboratory there is no specie of screw-worm prevalent in the area.

A nanny goat bearing tag No. 29205 was killed during the 1954 hunting season. She was released in 1941 as mature. This animal was probably 15 or 16 years old.

Spanish Peaks Goats

During an investigation on the ground in September, four goats were seen on Blaze Mountain. From the air five goats were seen on the mouth of Beartrap Creek. There was also a report of five goats seen at the West Gallatin River on the west side across the river from the mouth of Swan Creek. This is the extreme opposite end of the mountain range. There is a bare possibility it was sheep that were seen; however, no Department personnel have seen either in this exact locality. One other goat was seen on Table Mountain from the air during a mountain sheep census. These goats originated from a plant and are widely distributed. It is recommended that salt be placed in three localities to hold the animals at those particular sites. The roaming might be in search of natural lick sites that aren't available.

Beartooth Plateau Investigation

A back pack trip was made through the Beartooth Plateau Wilderness area. No goats were located on this trip. It is reported that at least some of the goats planted in the Rock Creek area (Red Lodge) several years ago have established near Line Creek just over the state line in Wyoming. An authentic report of five goats on Roundhead Mountain (Absaroka Wilderness Area) was received. These goats likely originated from a plant on the Stillwater River.

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Job Completion Report

Investigations Project

Work Plan I

Job No. III-M

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Moose (Eastern)

In general throughout the district the moose populations are holding up under present hunting regulations, from observations made incidental to other investigations.

West Fork of Madison River Moose

When the first moose investigation was made in this area it was determined that there was competition with domestic cattle and with elk. During the summer months cattle bedded and fought flies in the willow stringers along the smaller tributaries and along the main drainage. Some willow was probably taken as forage by cattle, but a good deal of it was rubbed on and broken down. More elk wintered in the area than there is now. Moose wintered along in the willow in greater numbers than now. The competition more than hunting has probably had more to do with the dispersement of the population into other hunting units, namely the Centennial Valley and Ruby River Valley. In recent years more moose have been reported in drainages further down the Madison River on the west side. For fear of decreasing hunter success this area is recommended to be closed to moose hunting this coming season.

East Side of Madison River - Spanish Creek Moose

The greater portion of this area was investigated on the ground. The Jack Creek area presents abundant use on browse species. The Spanish Creek area hasn't been hunted, but very little, due to access complications through private land. The moose are building up and by hunting mature bulls only the most favorable harvest has not been obtained. It is recommended that 20 permits for moose of either sex be issued for this area.

Shields River

Moose complaints from this area lead to investigation. Only a few moose were found to be in this area. It was felt that permittees not knowing the area or the habits of the moose would have little success. For this reason permits were recommended to be sold locally. This was done, yet the hunting success was low. The appeasement to ranchers by having the season has controlled the problem, at least for the present.

Hyelite Creek

By request from the Forest Service an investigation was made to determine the possibility of a harvest. This area was traversed quite thoroughly on horseback. The only sign of moose in any number was found between Window Rock Ranger Station and Hayelite Reservoir. Other sign was only occasional. There are a few moose on adjacent drainages; however it was felt that the population wasn't sufficient to provide even a mature bull harvest yet.

West Gallatin River

Besides the five mature bulls taken by permit holders, eight moose succumbed to careless shooting by reckless elk hunters.

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Job Completion Report

Investigations Project

Work Plan I

Job No. III-S

Title of Work Plan: Big Game Populations and Range Studies

Title of Job: Sheep (Eastern)

The 1954 sheep hunters were asked to bring the lungs of their animals into the checking station in the West Gallatin area. Lungs of all nine animals harvested were taken to the Veterinary Research Laboratory at Montana State College, Bozeman for examination.

- Specimen No. 5737 - No pneumonia. Eggs and larvae of lungworm (proto-strongylus) present.
- Specimen No. 5738 - Same
- Specimen No. 5742 - No pneumonia, no lungworms found
- Specimen No. 5743 - No pneumonia, no lungworms found
- Specimen No. 5744 - No pneumonia, two complete adult proto-strongylus and some fragments found in the bronchioles
- Specimen No. 5748 - No pneumonia, one adult proto-strongylus, no eggs, no larvae.
- Specimen No. 5786 - Adult lungworms in bronchioles, white consolidated areas in diaphragmatic lobe containing eggs, larvae and adults
- Specimen No. 5787 - No pathology, adults taken from bronchi and trachea.
- Specimen No. 5797 - One large lesion on the tip of the diaphragmatic lobe of each lung. Lungworms found in the bronchioles, many small lesions scattered over the surface of the lung. These lesions also contained eggs and larvae.

One specimen from the Stillwater area; numerous circumscribed, caseous nodules which contained eggs, larvae and adults. No. 5770.

Second specimen from Stillwater area. Badly decomposed, showed typical lungworm lesions on lung surface.

Five specimens from the Sun River area; all lungs infected with lungworm. Four lungs with circumscribed nodules which contained eggs, larvae and adults. One lung free of nodules but contained worms in trachea and bronchioles No. 5789.

No. 5799 - Sun River - Typical lungworm lesions on surface of lung.

During the bighorn sheep census in Sun River a ram (about six years old) was found down and unable to get up. He appeared bright and healthy but couldn't raise his hind quarters. He was alive for nine days after being picked up and brought to the Veterinary Research Laboratory. A complete autopsy was made. The only pathogenesis was more blood in the lateral brain ventricles than is usually found in other animals. The cause, possible concussion from fighting. Fecal examinations of the animal while still alive showed Ostertagia, and lungworm larvae. Post-mortem examination of the lungs showed two large lesions on the tips of the diaphragmatic lobes of the lungs. Adults were removed from the bronchioles. Many small white nodules were scattered over the surface of the lungs. No other parasites were found. No. 5788.

West Gallatin (Spanish Peaks) Mountain Sheep

Nine of the fifteen hunting permits issued for rams were filled. After locating high winter ranges a year ago those areas were inspected during the summer to determine the amount of range and to determine extent of winter losses if any. The slopes where sheep had been seen wintering was found to also be summer range. The amount of forage available during winter months is quite limited. However, on some windswept slopes where sheep had been seen wintering, there was a surprising density of alpine grasses and sedges. It will be interesting to note what territoriality will be exhibited between mountain sheep and mountain goats on this small range after the goat population increases.

Sixteen-Mile Creek

Four of the six bighorns transplanted in this area were reported on the west side of Six-Mile Mountain by a deer hunter October, 1954. A yearling ewe bearing ear tag No. 521 was found dead by a sheep herder west of Hay Creek between Wall and Grassy Mountains. It had been following a band of domestic sheep.

Madison Sheep

Eighteen bighorns were seen incidental to an elk census on the ridge between Moose and Squaw Creek.

Yellowstone Sheep

Eighteen sheep were located wintering in Tom Miner Creek.

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Wildlife Restoration Division

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Leader: J. E. Gaab

Job Completion Report

Work Plan II

Investigations Project

Title of Work Plan: Special Studies - Mule Deer Food Habits

FORAGE UTILIZATION ON KEY AREAS

Browse measurements were continued again this year on browse plants on the mule deer winter ranges on Scudder Creek and Lost Creek in the Pioneer Range. Spring measurements were made to check on winter utilization by deer and fall measurements were made to check on the amount of annual growth. Measurements were made on tagged plants within and without the exclosures.

Two 1,000 feet permanent transects were established, one in a Mountain Mahogany-Rocky Mountain Juniper area on Scudder Creek and one in the same vegetative type on Lost Creek. The browse plants concerned are: Mountain Mahogany (Cercocarpus ledifolius), Mountain Juniper (Juniperus scopulorum), Big Sage (Artemisia tudentata), Artemisia trifida, Rabbit Brush (Chrysothamnus nauseosus), Tetradymia canescens.

Ocular estimates of use were made on other sections of these two ranges. Also condition of the browse plants involved was noted.

Browse Usage

	Scudder Creek	Lost Creek
Mt. Mahogany	100% of available shoots	100% available shoots
Mt. Juniper	100% of available shoots	75% available shoots
Big Sage	Variable light to heavy use	Variable light to heavy use
Artemisia trifida	Moderate use	Moderate use
Rabbit Brush	Variable average about 50% of new growth	Variable average about 50% of new growth
Tetradymia	About 75% of new growth	About 75% of new growth

Comparative Annual Growth of Browse

	<u>Scudder Creek</u>	<u>Lost Creek</u>
Mt. Mahogany	Very little new growth	Very little new growth
Mt. Juniper	Very little new growth	Very little new growth
Big Sage	Probably average	Probably average
Artemisia trifida	Probably average	Probably average
Rabbit Brush	Probably average	Probably average
Tetradymia	Probably average	Probably average

Condition of Browse Plants

	<u>Scudder Creek</u>	<u>Lost Creek</u>
Mt. Mahogany	Most plants partially dead, or dead	Most plants alive but severely hedged
Mt. Juniper	All plants highlined but alive	Part of the plants highlined
Big Sage	Most plants in good condition, some on ridges heavily hedged	Plants in draws untouched, plants on ridges heavily hedged - some dead
Artemisia trifida	Quite a few young plants in some draws	Quite a few young plants in some draws
Rabbit Brush	About 50% browsed, plants vigorous	About 50% browsed, plants vigorous
Tetradymia	All plants appear to be browsed but unhurt	All plants appear to be browsed but unhurt

A comparison of browse usage between a deer winter range in poor condition and a deer winter range in good condition was made in March, 1955. The poor range was Scudder Creek in the Grasshopper area. The good range was Axes Canyon on the lower Blacktail. The Axes Canyon range supports a substantial deer herd during the winter and has an abundance of Mt. Mahogany.

The most significant difference in the browse usage in these two areas concerned Rocky Mountain Juniper. In Scudder Creek the Mt. Mahogany is composed mostly of partially dead or dead plants. Here it would be difficult or impossible for a deer to get enough to satisfy his hunger. On the Scudder Creek range all the juniper is highlined. In Axes Canyon where there is an abundance of vigorous Mt. Mahogany plants, more than required



A portion of the Scudder Creek deer range. The shrubs on the slope in the center of the picture are mostly Mountain Mahogany the outer branches of which are dead or partially dead.



Highlined Juniper and Mahogany on Scudder Creek,
note dead Mahogany left foreground.



Rabbit Brush on Scudder Creek which has been
"broomed" off.



Mountain Mahogany on Lost Creek showing how severely it has been hedged.



Fences constitute a hazard for deer suffering from malnutrition. A marrow sample from the femur of this buck denoted starvation.

by the present deer population, there is very little evidence of any use on Mt. Juniper.

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STATE Montana
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Title of Project: Lincoln County Deer Management Study

Leader: Robert M. Blair

Job Completion Report

Work Plan No. I

Job Nos. I-A,B,C

Investigations Project

Title of Work Plan: Big Game Population Studies and Development of Census Techniques

OBJECTIVES:

To determine by the Lincoln Index and Pellet Group Plot census techniques the wintering white-tailed deer population in the Fisher River-Wolf Creek area and to evaluate the reliability of these as well as other census techniques in population determination.

FINDINGS:

The occurrence of an overly mild and open winter prevented the undertaking of reliable population studies on the white-tailed deer herds utilizing the winter ranges. Animal use on the winter ranges normally occupied was extremely light and sporadic. Immediately following a snowfall, deer would move to lower elevations in the west and south exposures only to disperse again to higher elevations within a few days. Snow accumulation was below normal and as a result deer were able to utilize the spring, summer, and fall ranges where food was more abundant. In general, the south and west exposures of open yellow pine remained free of snow cover throughout most of the winter.

Individual box-type deer traps were located in the winter range for the purpose of trapping and marking animals prior to the application of the Lincoln Index census technique. However, the lack of herd concentrations prohibited trapping.

Permanent pellet groups plots were located in the range area for use in population determination, but the application of this technique was also curtailed by the abnormally light deer use in the wintering areas.

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Leader: Robert M. Blair

Job Completion Report

Job No. II-A

Investigations Project

Title of Job: Checking Stations

DATE: 1954 Big Game Hunting Season

PERSONNEL: Checking Station Operators

OBJECTIVES:

To collect and analyze data for the purpose of determining biological properties and trends of the deer herds utilizing the Fisher River-Wolf Creek range area.

INTRODUCTION:

For the sixth consecutive year the operation of checking stations on the perimeter of the Fisher River-Wolf Creek area has proven highly advantageous. With properly located stations it is possible to collect a considerable amount of biological data, concerning the deer herds, over a short period of time. The collection and analysis of this data is not only basic to the proper management of deer herds but it is also of great value in correlation with other phases of the Lincoln County Study.

The regular big game season on buck deer in Lincoln County extended from October 15 through November 15, a total of 32 days. An either sex deer season ran concurrently with the buck season from October 31 to November 15, inclusive, a total of 16 days. As the result of an extremely low harvest the either sex season was extended in the Fisher River-Wolf Creek drainages from November 16 through December 3, giving an additional 18 days of hunting in this area. In conjunction with the deer season the regular bull elk season ran from October 15 through November 15.

The principal area covered by the data in this report includes all of the lower Fisher River and its tributaries north of U. S. Highway No. 2. This is an area of approximately two hundred and thirty-two thousand acres. With the exception of a few scattered homesteads, title to the land is held by the Anaconda Copper Mining Company, J. Neils Logging and Lumber Company, Northern Pacific Railroad, State of Montana, and the Kootenai National Forest.

Vegetative cover on the area varies according to site. In general ponderosa pine dominates the south and west exposures with western larch and Douglas fir the dominants in the north and east exposures. The lower flats and benches are covered, to a great extent, with "doghair" stands of lodgepole pine, interspersed with thickets of Douglas fir; the overstory primarily being ponderosa pine and western larch.

Summer range conditions are classified as good to excellent with respect to available browse. However, the winter ranges, consisting of approximately twenty-eight thousand acres, are in fair to critical condition. During severe periods of excessive snow accumulation the white-tailed deer, and generally elk, are further restricted to a critical winter range of approximately 9,300 acres consisting of stream bottoms and low bench lands.

Intensive investigations have been annually concentrated on the white-tailed deer herds utilizing this area due to the heavily overpopulated condition and critical depletion of winter ranges. The increasing seriousness of the long evidenced deer-winter range-timber reproduction confliction warrants immediate measure toward alleviating this problem.

TECHNIQUE:

Station Operation: Two big game checking stations were maintained by the Lincoln County project from October 15 to December 3, 1953, inclusive. Both stations were located so as to collect data from the Fisher River-Wolf Creek area only. As in the past, the position of these stations permitted the collection of approximately 95 to 98 per cent of the over-all hunting data from the area.

Stations were operated by one man during the bucks only portion of the season and by two men during the either sex portion. Operators were maintained in a 24 hour duty.

It is felt that the excellent cooperation received each year from the sportsmen is due to their interest in the advancement of biological work in the area as well as to the courtesy and efficiency of the station operators. At least one checker per station was a local resident which has annually proven of great value in aiding hunters with general questions concerning hunting sites and conditions. This asset aids tremendously in strengthening the sportsmen-Department relations.

The names of checking station personnel and station locations are listed in Table 1.

All biological and statistical data were recorded on standard cards and forms. At the close of the big game season the data were classified and analyzed for reporting and correlation with other phases of study. Information collected with respect to animal kill included species, sex, antler beam diameter of bucks, number of

TABLE 1

CHECKING STATIONS AND PERSONNEL MAINTAINED BY THE
LINCOLN COUNTY PROJECT DURING THE 1954 BIG GAME SEASON-
OCTOBER 15 to DECEMBER 3, INCLUSIVE

<u>Station</u>	<u>Checkers</u>	<u>Station Location</u>
Waylett's	Paul Stamschror (Oct. 15-Dec. 3) James Ramsey (Oct. 31-Dec. 3)	Sec. 19, T27N, R30W At Jct. of Hwy. #2 and the lower Fisher River road.
Island Lake	William Boothman (Oct. 15-Dec. 3) John B. Dillon (Oct. 31-Dec. 3)	Sec. 31, T29N, R26W At south end of Island Lake

antler points, weight, length of hind foot, age (lower jaws of deer were collected for past season verification of age), reproductive tracts from does, and location of kill.

Information collected concerning hunter statistics included name, address, big game license number, automobile license number and county of permanent residence.

During the over-all season hunters were asked to stop for checking only on leaving the area, at which time data cards were filled out on successful hunters, though a daily total count was maintained on those which were unsuccessful. Throughout the either sex portion of the season cars were also asked to stop on entering the area so that plastic bags and explanatory data could be given to each person for the purpose of collecting female deer reproductive tracts.

FINDINGS:

The same general climatic pattern that existed during the 1952 and 1953 big game seasons again hampered the seriously needed deer harvest. Mild weather and lack of snow was not conducive to good hunting, note Table 2. Even though rain occurred over much of the season, snow was virtually absent on the higher slopes which retarded deer movement to the lower elevations and open timbered sites.

The annual occurrence of mild weather during the hunting season has been concluded as one of the more important factors contributing to a deficient seasonal deer harvest.

TABLE 2

DAILY WEATHER CONDITIONS DURING THE 1954 BIG GAME SEASON*

Date	Temperature		Precipitation	
	Maximum	Minimum	Amount	Type
Oct. 15	63	30		
16	No records			
17	No records		.06	Rain
18	50	32		
19	50	37	.02	Rain
20	56	33	.04	Rain
21	50	42	.09	Rain
22	53	37	.22	Rain
23	51	28	.01	Rain
24	50	26		
25	52	19		
26	51	17		
27	55	21		
28	59	45		
29	48	22		
30	44	23		
31	40	27		
Nov. 1	46	23		
2	42	25		
3	34	25		
4	40	27		
5	46	28		
6	No records		.20	Rain
7	No records			
8	47	40		
9	47	37	Trace	Rain
10	56	39	.07	Rain
11	No records			
12	43	35	.01	Rain
13	48	33		
14	44	37	.08	Rain
15	46	40	.01	Rain
16	47	40	.48	Rain
17	47	34	.15	Rain
18	47	38	.03	Rain
19	56	39		
20	No records			
21	No records			
22	58	30		
23	56	29		
24	38	34		
25	No records		.13	Rain
26	44	38	.02	Rain
27	46	32		
28	36	27		

* All weather data taken from the Libby Ranger Station, Kootenai National Forest.

TABLE 2 (Continued)

Date	Temperature		Precipitation	
	Maximum	Minimum	Amount	Type
Nov. 29	32	20		
30	33	21		
Dec. 1	32	23	Trace	Snow
2	31	23		
3	31	27	Trace	Snow

Hunter Harvest: Throughout the Fisher River-Wolf Creek area 3,398 hunter units (individual and separate hunter trips) killed 467 white-tailed deer, 53 mule deer, 24 bull elk and 5 black bear. This gives an individual hunter trip success of only 16.16 per cent.

Each year the Island Lake station checks a greater portion of hunters and harvest due primarily to the fact that this station is the entrance and exit point for hunters from Flathead and outlying counties of greater population densities. As can be seen in Table 3 this station checked 326 or 62.69 per cent of the total deer harvest in the area, while the Waylett's station checked 194 or 37.31 per cent of the deer harvest.

TABLE 3

DEER KILL RECORDED IN THE FISHER-WOLF CREEK AREA 1954 BIG GAME SEASON

Station	White-tailed Deer	Mule Deer	Total	% of Total Kill	No. of Hunters	% of Hunter Trip Success
Island Lake	300	26	326	62.69	1,949	16.71
Waylett's	<u>167</u>	<u>27</u>	<u>194</u>	<u>37.31</u>	<u>1,420</u>	<u>13.66</u>
	467	53	520	100.00	3,369	15.43

White-tailed deer made up 89.81 per cent of the total deer harvest, note Table 4. In general, the mule deer range higher and farther from access roads and are therefore less apt to be taken by the average hunter. Also this species is not as preferable as the white-tailed deer to the hunters in this locality.

Adult bucks made up 42.12 per cent of the total deer harvest. If fawns were included bucks would comprise 51.35 per cent of

TABLE 4

BUCK-DOE-FAWN KILL IN THE FISHER-WOLF CREEK AREA
1954 BIG GAME SEASON

	White-tailed Deer				Mule Deer			
	Bucks	Does	Fawns	Total	Bucks	Does	Fawns	Total
No. Killed	194	182	91	467	25	20	8	53
Per Cent of Kill by Species	41.54	38.97	18.49	100.00	47.17	37.73	15.10	100.00
Per Cent of Total Kill (1954)	37.31	35.00	17.50	89.81	4.81	3.84	1.54	10.19
Per Cent of Total Kill (1953)	32.49	32.81	23.59	89.59	7.26	2.52	0.63	10.41

the total kill. A total of 44 white-tailed and 4 mule deer buck fawns and 48 white-tailed and 4 mule deer doe fawns were harvested.

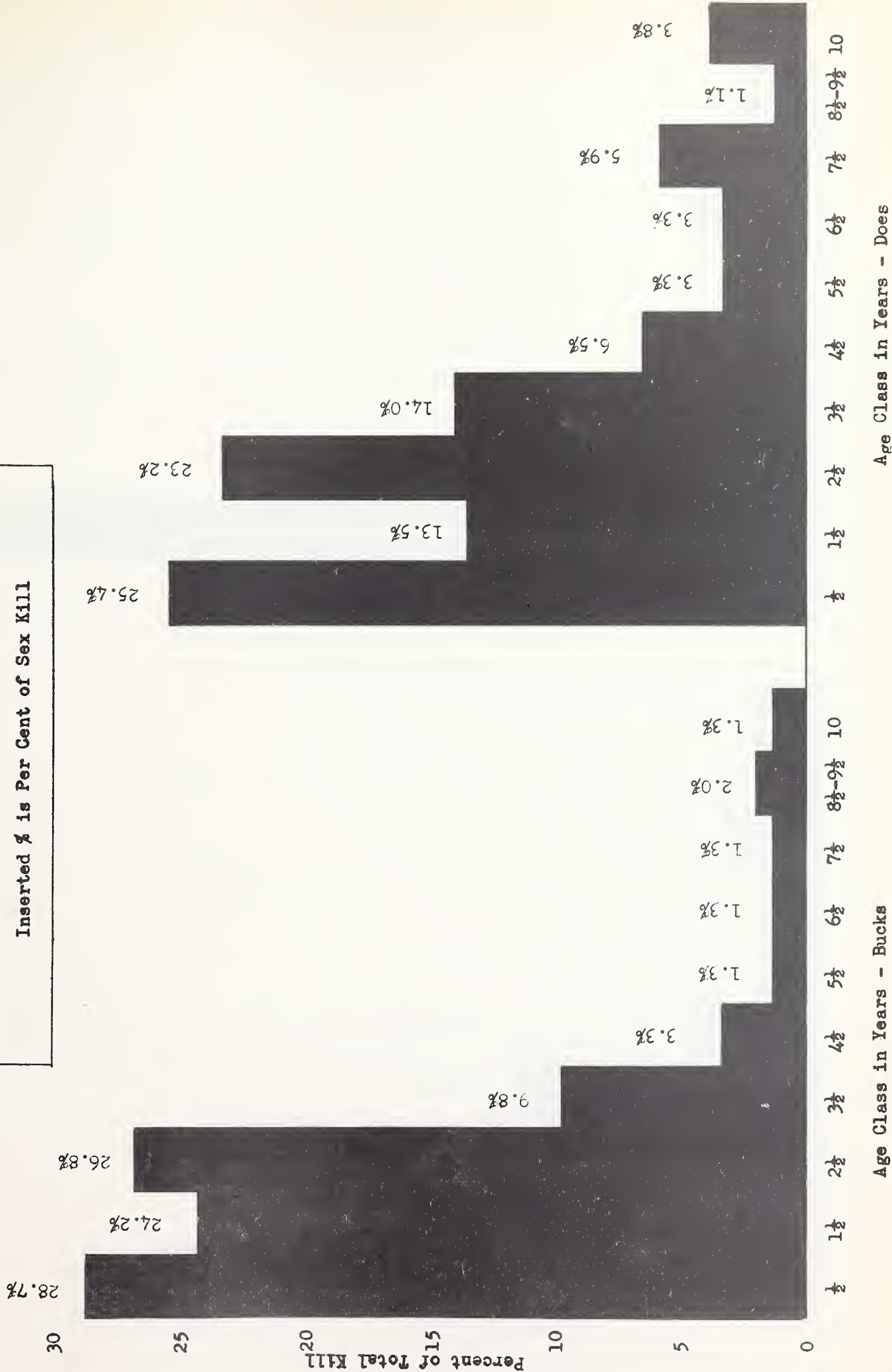
The sex and age class composition of the white-tailed deer harvest was found to be as follows: 1.07 mature bucks were killed per 1.00 mature doe; 0.50 fawns were killed per mature doe; and 0.94 buck fawns were killed per 1.00 doe fawn. The relationship of this composition is further indicated in Figure 1 where the percentages of kill by sex and age class are given.

Age Composition of White-tailed Deer Harvest: The lower jaws of 72.4 per cent of the total white-tailed deer harvest were collected through the checking stations and aged according to the Severinghouse method. An attempt was made to collect and age the lower jaws of mule deer; however, the available sample was too small to be of reliable significance.

The combined percentages of age classes $\frac{1}{2}$ through $3\frac{1}{2}$ years old comprise 84.8 per cent of the total white-tailed deer kill, note Figure 1. This is further evidence, in conjunction with past records, that the animals in the older age classes have been reduced and a more potential young age group is being maintained. It has been assumed that there is no selective harvest with regards to age class beyond fawns. To allow for the possible selectivity with regards to fawns, Figure 2 is shown inclusive and exclusive of the six month age class.

FIGURE 1.

PERCENT KILL BY AGE CLASS AND SEX - WHITE-TAILED DEER
 1954 BIG GAME SEASON
 FISHER RIVER - WOLF CREEK AREA
 Inserted % is Per Cent of Sex Kill



35

30

25

20

15

10

5

0

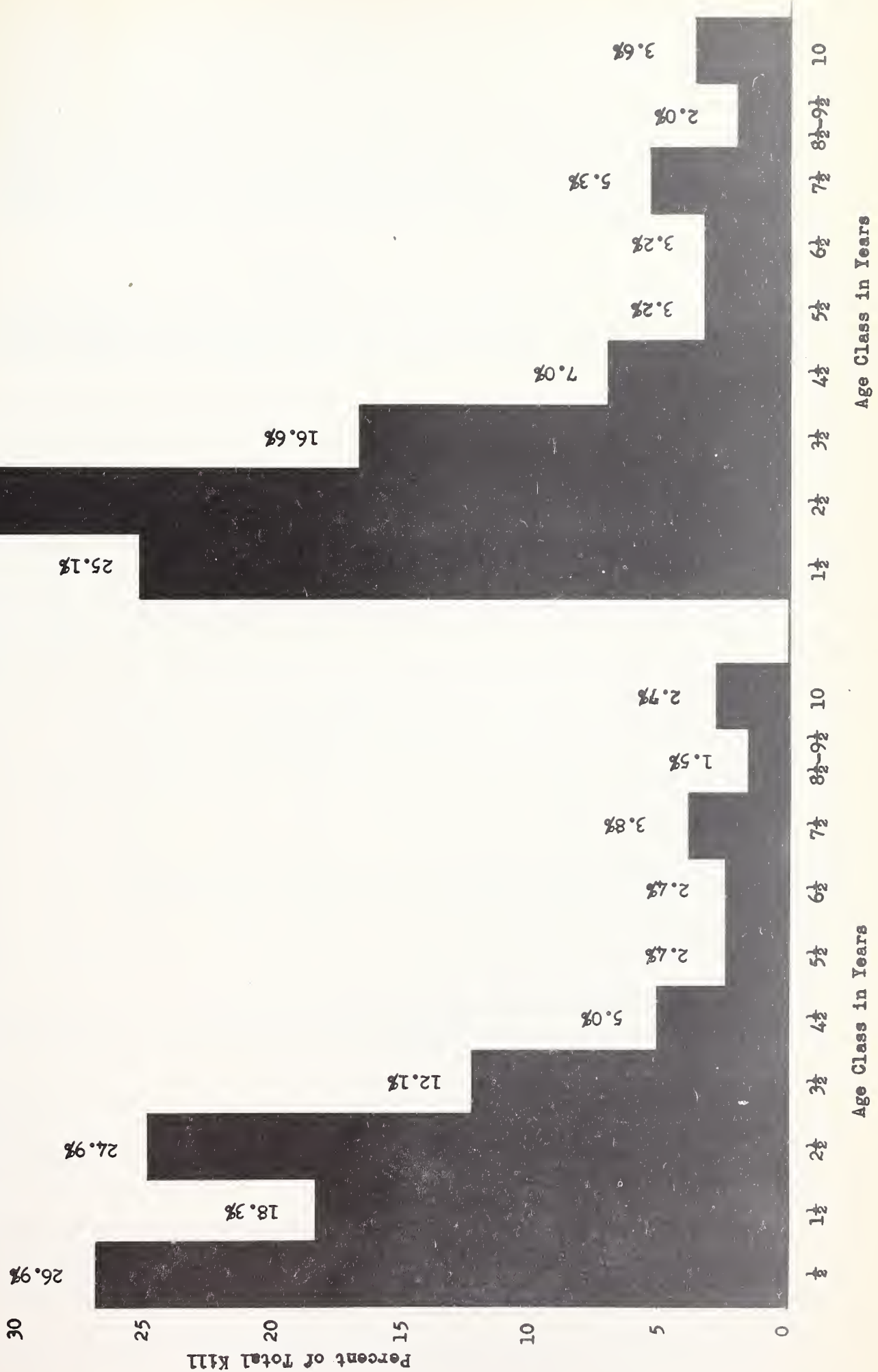
Percent of Total Kill

FIGURE II.

PER CENT OF TOTAL WHITE-TAILED DEER KILL BY AGE CLASS

1954 BIG GAME SEASON

FISHER RIVER - WOLF CREEK AREA



Weights: Table 5 denotes the comparable average hog-dressed weights of white-tailed deer harvested during both the 1953 and 1954 hunting season. In general, the weights increased during the latter year despite the fact that the herd suffered a calculated 11.24 per cent mortality through starvation during the winter of 1953-54.

TABLE 5

AVERAGE HOG-DRESSED WEIGHT OF THE WHITE-TAILED DEER BY SEX AND AGE CLASS -- FISHER RIVER-WOLF CREEK AREA, 1953 AND 1954 BIG GAME SEASONS

		1953								
		Age Class in Years								
		$\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{2}$	$7\frac{1}{2}$	8-9 10
Buck		58.5	100.3	128.1	157.7	171.2	169.7	174.3	169.5	182.0 175.5
Sample		40	49	19	7	10	4	3	2	1 2
Doe		54.7	85.7	101.7	102.3	110.2	109.1	105.5	109.2	102.6 102.8
Sample		31	22	27	13	2	8	4	4	7 10

		1954								
		Age Class in Years								
		$\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{2}$	$7\frac{1}{2}$	8-9 10
Buck		56.4	107.2	137.6	149.6	155.4	169.0	179.0	176.5	168.3 179
Sample		43	46	41	15	5	2	2	2	3 2
Doe		57.1	94.6	107.6	111.1	110.0	101.0	116.6	120.6	114.0 108.5
Sample		46	24	41	26	12	6	6	11	2 7

A graphic comparison of the average hog-dressed weights of white-tailed bucks and does is shown in Figure 3.

A factor of great importance which has consistently been shown from records of this area is the general stabilization of buck and doe weights at an early age, Figure 3. This further indicates that a young and potential deer herd can be maintained without a sacrifice in mature animal weight loss.



Weight loss trends in direct relation to overutilized ranges have repeatedly been found in many deer problem areas. Hence, it is recommended that careful attention be given to future weight trends in relation to the overused winter ranges in this locality.

Hunter pattern: From October 15 through October 30 (bucks only) 18.4 per cent (620) of the total deer hunters harvested 3.8 per

AVERAGE HOG-DRESSED WEIGHTS BY SEX AND AGE CLASS

WHITE-TAILED DEER 1954 BIG GAME SEASON

FISHER RIVER - WOLF CREEK AREA

 Bucks
 Does

Weight of Pounds

 $\frac{1}{2}$ 1 $\frac{1}{2}$ 2 $\frac{1}{2}$ 3 $\frac{1}{2}$ 4 $\frac{1}{2}$ 5 $\frac{1}{2}$ 6 $\frac{1}{2}$ 7 $\frac{1}{2}$ 8 $\frac{1}{2}$ -9 $\frac{1}{2}$

10

Age Class in Years

cent (20) of the total deer kill, giving a hunter trip success of 3.2 per cent. During the period from October 31 through November 15 (either sex) 45.8 per cent (1,543) of the total deer hunters took 50.0 per cent (260) of the total deer kill, giving a hunter trip success of 16.9 per cent. And from November 17 through December 3 (either sex extension) 35.8 per cent (1,206) of the total deer hunters harvested 46.2 per cent (240) of the season's deer kill, giving a hunter trip success of 19.9 per cent. A graphic comparison of the season's hunting pressure and deer kill is given in Figure 4.

The increase in the success per cent during the either sex season extension can, in a larger part, be attributed to improvement in hunting condition. Not only had deer begun to move to lower elevations where they were more accessible, but climatic conditions were more favorable to hunting and the existence of rutting season (indications were of later rut) made the deer less wary and elusive.

Deer kill locations were recorded and plotted on maps, though this data is not presented here. The facts borne out by this information substantiates the trends in the general type of hunting for the locality. This hunting pattern consists of the majority of kills being made very close to access roads, commonly referred to as "road hunting." Such a pattern is another of the factors attributing to a deficient harvest inasmuch as the greater percentage of deer range back away from the access roads during the principal part of the hunting season (dependent on existing weather).

Source of Hunters: 520 resident deer hunters from 12 counties shot their deer in the Fisher River-Wolf Creek area during the 1954 big game season. Also, 3 non-resident hunters from Minnesota and 1 from Washington were successful in obtaining a deer.

As in the past, Flathead County comprised the largest percentage of successful deer hunters, 63.6 per cent, while Lincoln County was second with 22.5 per cent, note Table 6.

The lack of sufficient hunting pressure is felt to be the third major factor contributing to a deficient deer harvest. The local and immediately surrounding area (within the state) does not have a source of adequate sportsmen density. Also with the buildup of deer herds in other parts of Montana many hunters that previously traveled to Lincoln County now hunt closer to their residence.

DISCUSSION:

The deer harvest in the Fisher River-Wolf Creek area was again far below that needed for adjustment to a proper winter range-animal balance. This excessive past season increment has annually resulted in an accumulative burden on the already

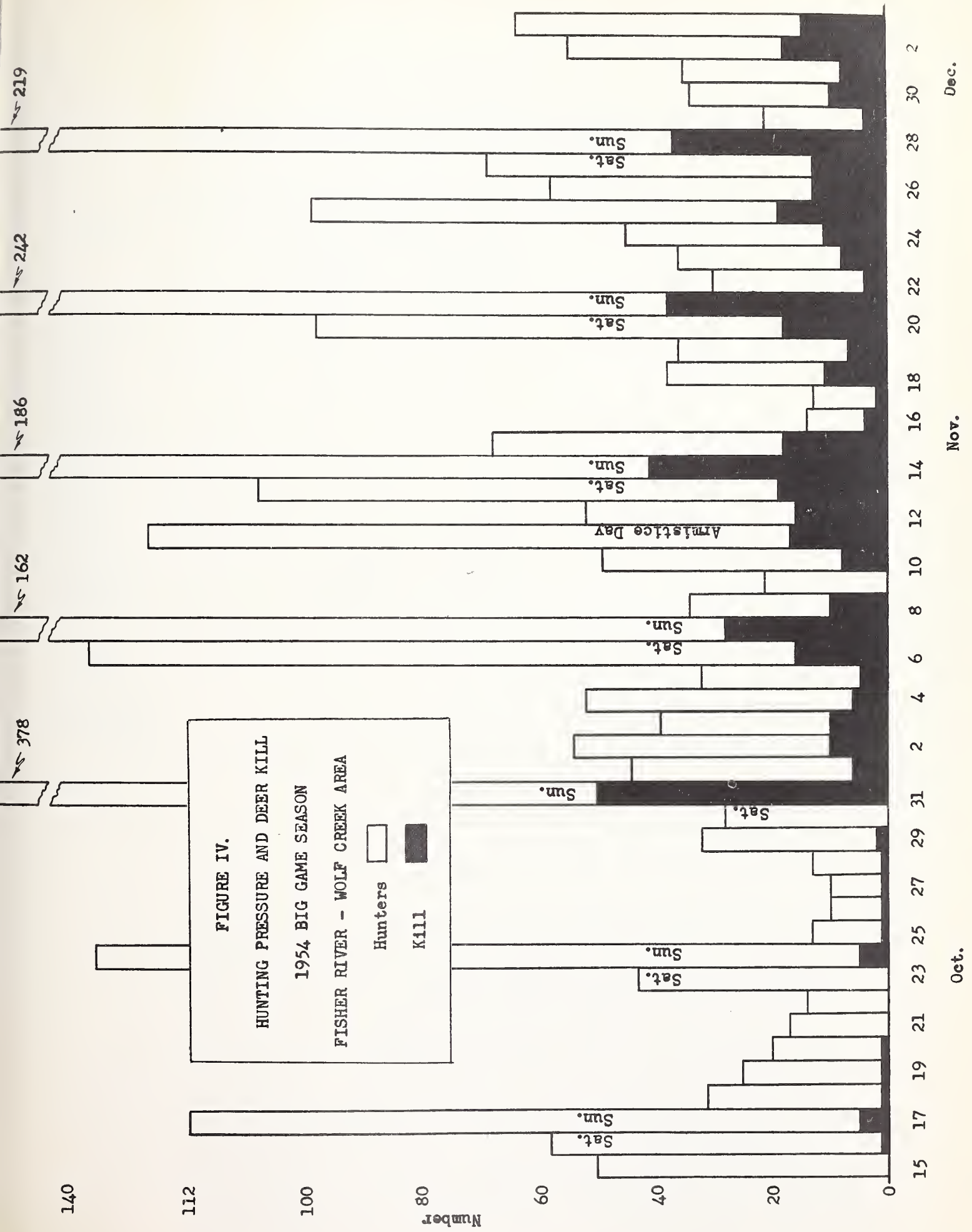


TABLE 6

SOURCE OF SUCCESSFUL DEER HUNTERS, FISHER-WOLF CREEK AREA,
1953 AND 1954 BIG GAME SEASON

County	1953		1954	
	Number of Hunters	Per cent of Total	Numbers of Hunters	Per cent of Total
Flathead	136	42.9	332	63.8
Lincoln	105	33.1	118	22.7
Lake	33	10.4	35	6.7
Glacier	8	2.5	7	1.3
Pondera	10	3.2	1	0.2
Missoula			2	0.4
Sanders	6	1.9	4	0.8
Sheridan			5	0.9
Hill	4	1.3	4	0.8
Toole	5	1.6	2	0.4
Cascade	3	0.9	2	0.4
Blaine			2	0.4
Ravalli	1	0.3		
Unknown	3	0.9	2	0.4
<u>State</u>				
Minnesota			3	0.6
Washington	3	0.9	1	0.2
Total	317	99.9	520	100.0

overutilized winter ranges.

For the past 20 years game range investigations in this area have conclusively showed: 1. A continued maintainance of white-tailed deer populations far beyond a proper winter range condition balance, 2. Annual overutilization of winter ranges resulting in the loss of valuable conifer reproduction by browsing and the depletion of watershed cover as well as species of important deer browse, and 3. A deficient annual deer harvest. The existence of these factors result not only in the loss of harvestable animals through winter mortality but also jeopardize the future of the white-tailed deer herds by permitting the already over-stocked winter ranges to be depleted beyond feasible recovery. The prolongation of cooperative measures to alleviate this complex problem of overpopulation increases the time that will be necessary to repair damage already done to the winter ranges. Even of greater importance

is the fact that much of the damage and loss that has already taken place can never be replaced or compensated for.

CONCLUSIONS:

1. The factors of mild weather conditions, lack of adequate hunting pressure, and the pattern of "road hunting" were responsible for a deficient deer harvest with respect to excessive animal populations and depleted winter ranges in the Fisher River-Wolf Creek area.
2. Three thousand, three hundred and ninety-eight individual hunters trips harvested 467 white-tailed deer, 53 mule deer, 24 bull elk and 5 black bear, giving a hunter trip success of 16.16 per cent.
3. Annual investigations in the Fisher River-Wolf Creek for the past several years, have conclusively shown:
 - a) Continued maintenance of excessive white-tailed deer populations.
 - b) Continued over-utilization of winter ranges resulting in the destruction of conifer reproduction and the increased depletion of valuable watershed cover and forage for sustaining deer herds.
 - c) Deficient annual deer harvest which is primarily responsible for conditions in a. and b.
4. White-tailed deer comprised 89.81 per cent of the total deer harvest. Mature bucks made up 42.12 per cent of the total deer harvest, and all bucks comprised 51.35 per cent of the harvest.
5. Buck-doe-fawn kill ratio was 1.07:1.00:0.50. The ratio of buck to doe fawns in the harvest was 0.94:1.00.
6. Lower jaws of 72.4 per cent (very few lower jaws from fawn were collected due to ease in field aging) of the total white-tailed deer harvest were collected and aged. There were 84.8 per cent of the sample jaws within the $\frac{1}{2}$ through $3\frac{1}{2}$ year age class.
7. 18.4 per cent of the seasons deer hunters (individual hunter trips) harvested 3.8 per cent of the total deer kill during the bucks only season. 45.8 per cent of the total deer hunters (individual hunter trips) harvested 50.0 per cent of the deer during the regular either sex season and 35.8 per cent of the total hunters (individual hunter trips) harvested 46.2 per cent of the season's deer kill during the 18 day either sex season extension.

8. Representatives from twelve Montana counties and the states of Minnesota and Washington were successful in killing deer in the Fisher River-Wolf Creek area. Residents of Flathead County comprised the largest number of successful hunters, 63.8 per cent, with Lincoln County second, 22.7 per cent, and Lake County third with 6.7 per cent.

RECOMMENDATIONS:

1. Due to an abundance of certain types of deer herd information the extent of biological data collected through checking stations should be revised to include only species, sex, age (lower jaws of white-tailed deer), weight, and female reproductive tracts from white-tailed deer. Other types of data formerly collected should be taken periodically at about five year intervals for comparison with past records.
2. Checking stations should be maintained only during the either sex deer season with one permanent attendant and one assistant on week-ends and holidays. Hunting pressure has consistently been too light during the bucks only season to warrant the cost and value of a station operation.
3. A sound public education program should be continued to inform the sportsmen on existing game population and range conditions for the purpose of agreement and action in alleviating problems that exist.
4. Immediate measures should be undertaken to facilitate a greatly increased deer harvest, primarily white-tailed deer, in the Fisher River-Wolf Creek area. This is essential to relieve the existing and increasing problem of destruction to conifer reproduction, depleted watershed cover, and depleted deer and elk winter ranges by excessive animal populations. The conservation of natural resources and wise land use is the direct responsibility of all people thus warranting cooperative planning and action toward alleviating the problems.
5. Elk populations over much of Lincoln County have rapidly increased over the past five years as evidenced by field observations and reports. In many areas elk are competing directly with deer for available winter feed. For this reason it is recommended that immediate measures be undertaken to increase the annual harvest of this species by the use of a limited either-sex season in conjunction with the regular bull season.
6. Copies of the compiled report on the big game hunting season and other pertinent studies in this area should be made available locally to sportsmen groups and interested parties to acquaint them with the annual findings which they help to

accumulate and the existing game range problems.

Submitted by:

Name Robert M. Blair

Title Junior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-36-R-5
DATE July 15, 1955
VOL. VI NO. 2

Title of Project: Lincoln County Deer Management Study

Leader: Robert M. Blair

Job Completion Report Job No. II-B Investigations Project

Title of Job: Deer Herd Composition Counts

PERSONNEL:

John B. Dillon, Junior Biologist
U. S. Forest Service, Kootenai National Forest

DATES:

December and January

OBJECTIVES:

To determine the sex and age composition of white-tailed deer herds in Lincoln County.

INTRODUCTION:

As an integral part of sound herd management it is essential to periodically determine the sex and age composition of important deer populations. This affords valuable data for evaluating the composition trend of the herds under the influence of existing hunting regulations, range conditions, and decimating factors.

Normally herd composition counts are taken during mid-December; however, mild weather prohibited the collection of reliable buck-doe-fawn ratio data this year. Personnel of the U. S. Forest Service and Montana Fish and Game Department, on several occasions, attempted the collection of ratio data without success. Animals were found to be widely scattered and the herds had not begun to move toward the wintering areas. The continuation of mild weather and the shedding of antlers by the bucks voided all possibilities of a reliable buck-doe-fawn count. Hence, it was decided that an adult-fawn ratio count would be attempted at a later date on the white-tailed deer herds wintering in the Fisher River-Wolf Creek area.

TECHNIQUE USED:

In January key sampling areas were determined for an adult-fawn ratio count in the Fisher River-Wolf Creek drainages. Field counting was restricted to the hours between sunrise and mid-morning. It was during these hours that the maximum diurnal movement of deer was noted. Movement during mid-afternoon and evening was too slight to warrant an attempted count. Care was exercised in obtaining a representative sample of the over-all wintering area to compensate for variation in herd composition with respect to changes in elevation and vegetative types.

All deer observed were recorded on standard forms and classified as adult, fawn, or unknown.

FINDINGS:

It must be emphasized that the ratio counts were attempted during a very mild winter when the south and west exposures were free of snow. Deer were also extremely wary which further hindered reliable counting. Few large groups of animals were noted and their wariness often resulted in incomplete group counts and classification.

A total of 216 white-tailed deer were recorded. The composition of the total count was 157 adults, 49 fawns, and 10 unclassified, giving an adult-fawn ratio of 100:31.

SUMMARY:

As a result of the mild weather, lack of herd concentrations, and other hindering factors it is felt that the sample adult-fawn count was not reliable for use in conjunction with other phases of study.

Submitted by:

Approved by:

Name Robert M. Blair

Montana State Fish and Game Department

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Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-36-R-5
DATE	July 15, 1955
VOL.	VI NO. 2

Title of Project: Lincoln County Deer Management Study

Leader: Robert M. Blair

Job Completion Report

Job No. II-C

Investigations Project

Title of Job: Winter Mortality Counts

OBJECTIVES:

To determine the natural winter loss to white-tailed deer herds utilizing the Fisher River-Wolf Creek ranges.

FINDINGS:

As a result of an overly mild winter, deer herds were not compelled to move into the already overutilized ranges on the Fisher River-Wolf Creek drainages. Throughout the greater part of the season the animals remained dispersed on the spring, fall, and to some extent summer ranges. In these areas food is far more abundant which resulted in an insignificant winter mortality. Widely scattered carcasses were observed, however, not in numbers sufficient enough to warrant an intensified count and classification.

SUMMARY:

The occurrence of an open winter permitted the white-tailed deer herds to remain on areas of greater food availability. This not only resulted in an insignificant winter mortality but also further intensified the existing problem of overpopulated winter ranges.

For the past twenty years records have evidenced the fact that excessive white-tailed deer populations have been maintained on the Fisher River-Wolf Creek wintering areas. This overbalanced condition has, at an annually increased rate, depleted the available food supply and condition of winter ranges. At the present time the majority of the range area is classified as poor to critical with respect to a sustaining food supply.

The complex problem is further aggravated each year by an inadequate harvest of surplus animals, excessive predator control, and successive mild winter which result in an increase of surplus animals. Climatic conditions cannot be controlled, however, herd harvest and predator control can and must be properly

manipulated in conjunction with the former in an attempt to strive for a more reasonable range-animal balance. If this is not done natural forces will inevitably take the surplus that should be properly harvested and utilized by sportsmen.

Continuation of factors which favor increased or excessive populations annually operates against a reasonable range-animal balance and sound herd management.

Submitted by:

Name Robert M. Blair

Title Junior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-36-R-5
DATE	July 15, 1955
VOL. VI	NO. 2

Title of Project: Lincoln County Deer Management Study

Leader: Robert M. Blair

Job Completion Report Job No. III-A Investigations Project

Title of Job: Experimental Revegetation of Game Ranges

PERSONNEL:

Owen A. Wilson, Biologist, Lincoln County Study
John B. Dillon, Jr. Biologist, Lincoln County Study
Robert M. Blair, Biologist, Western Unit
Montana Fish and Game Department Fencing Crew

OBJECTIVE:

To determine the feasibility of establishing important native browse species by reseeding on burned and scarified areas in ponderosa pine-western larch benches.

INTRODUCTION:

The timber-wildlife aspect of land management is of increasing importance in Lincoln County as well as other areas. The overutilization of winter game ranges by excessive white-tailed deer herds has resulted in conflicting interests concerning wise land use. Overbrowsed ranges show a marked desirable deer food deficiency, reproduction of economically important timber species, and an adequate watershed vegetative cover. This has prompted experimentation toward re-establishing palatable browse species not only as a possible buffer against the utilization of conifer reproduction but also as an attempt to revegetate depleted watershed cover.

On an overutilized winter range area such as the Fisher River-Wolf Creek region, if palatable forage is to be restored, there are four possible basic approaches: deer herd reduction, range revegetation by reseeding native browse species, range revegetation by using nursery grown browse stock, or a combination of these methods. Under the existing levels of excessive wintering deer populations it is essential that the first approach be basic to the others. Any feasible range revegetation program would immediately result in failure by the destructive overuse of seedlings unless the existing herds were excluded from the

planting area or reduced to a reasonable level of density.

TECHNIQUES USED:

During the summer of 1954 the entire Fisher River-Wolf Creek area was thoroughly checked and considered in relation to the selection of proper reseeding study sites. Two similar planting areas were selected on Wolf Creek on the basis of soil, slope, shade, exposure, and other factors affecting vegetative growth. One study plot, $44\frac{1}{2}' \times 144'$, was marked out on each of the two areas and these plots fenced against deer. A two chain buffer zone to safeguard against vegetative disturbance by logging was also marked and bounded by a single strand of wire.

Individual planting blocks within each plot were either burned or scarified to eliminate vegetative competition and condition the soil according to the requirements set forth in the experimental design of the study. The arrangements of plots and planting units were in accordance with a randomized block design using a split block technique.

To obtain stock for planting, approximately 10,000 seeds each of five native browse species were collected, cleaned, and put in dry storage during the summer of 1954. Species chosen for study were: bitterbrush (Purshia tridentata), serviceberry (Amelanchier alnifolia), chokecherry (Prunus demissa), snowberry (Symphoricarpos alba), and mountain maple (Acer glabrum).

In an attempt to break seed dormancy and improve the germination and emergence percentage all seeds were subjected to pre-planting treatment by stratification. From January to the scheduled planting time in June, 1955, seeds of each species were stratified in moist sand at controlled temperatures. The treatment period per species is in accordance to the time determined as necessary to break seed dormancy. As a safeguard against pre-planting germination and loss of stock two lots of seed (5,000 each) per species were placed under treatment, the second lot twenty days later than the first.

SUMMARY:

The pre-planting preparation of study plots has been completed with the exception of various minor details. All seed to be used in the study are undergoing pre-planting treatment by stratification at the present time. The results of the seed treatment phase of the overall study will be analyzed in conjunction with that conducted last year and the data compiled for reporting at a later date.

Submitted by:

Approved by:

Name Robert M. Blair

Montana State Fish and Game Department

Title Junior Biologist

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-36-R-5
DATE July 15, 1955
VOL. VI NO. 2

Title of Project: Lincoln County Deer Management Study

Leader: Robert M. Blair

Job Completion Report Job No. IV-A Investigations Project

Title of Job: Study of Ecological Changes Resulting from Deer Browsing

OBJECTIVES:

To determine the effect that wintering white-tailed deer in the Fisher River-Wolf Creek area have upon conifer reproduction and to determine the stages of vegetative succession that might be expected in an undisturbed area.

FINDINGS:

A complete field count of all conifer reproduction by species and age class was started within the Wolf Creek deer enclosure and control plot. To date this count has not been completed. Findings will be compiled and conclusions reported at a later date.

The field reading of vegetative succession plots located within the Wolf Creek enclosure and control areas was inactive during the report period. The necessity of conducting other important phases of the Lincoln County study did not permit adequate time on this job.

Submitted by:

Name Robert M. Blair

Title Junior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-36-R-5
DATE	July 15, 1955
VOL.	VI NO. 2

Title of Project: Lincoln County Deer Management Study

Leader: Robert M. Blair

Job Completion Report

Job No. V-A

Investigations Project

Title of Job: Browse Utilization, Soil, and Range Survey

OBJECTIVES:

To determine factors of range use and condition, forage availability and the effect of natural clay licks upon the use of forage and deer nutrition.

FINDINGS:

Inactive during the report period. The lack of available time and assignment of a new man to the study prohibited specific work on this phase of study.

RECOMMENDATIONS:

From the analyses of data collected in the Lincoln County Deer Study and innumerable field observations it is recommended that greater emphasis be placed on adequate winter range condition and use surveys, primarily in areas utilized by white-tailed deer. The already heavy, critically overused condition of winter ranges in conjunction with the continued maintenance of excessive populations has, and will, result in many complex problems involving multiple land use. The trend of conservation agencies and sportsmen groups has been to place a strong emphasis on the need for total population number with a tendency to slight existing range conditions.

It is felt that progress toward wise land use can best be attained by concentrating greater effort on the study of range condition and use trends as this is the basis to the continued maintenance of a huntable game resource.

To permit such a transition it is recommended that intensive work on total populations be replaced wherever possible with investigations on unit population densities in conjunction with existing range condition. Total herd numbers have long been subjected to controversy and disagreement and this alone has often delayed progress and weakened the sportsmen's confidence

and support in investigative work.

Submitted by:

Name Robert M. Blair

Title Junior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana		
PROJECT NO.	W-36-R-5		
DATE	July 15, 1955		
VOL.	VI	NO.	2

Title of Project: Lincoln County Deer Management Study

Leader: Robert M. Blair

Job Completion Report Job No. VI-A Investigations Project

Title of Job: Studies of the Effect of Big Game Management Practices

OBJECTIVES:

To evaluate quantitatively each new method of game manipulation.

FINDINGS:

Inactive during report period. The lack of allowable time prohibited a specific evaluation of the effectiveness of various management practices on the white-tailed deer herds.

SUMMARY:

Work accomplished on this phase of the project was incorporated into other job reports. The principal management practice applied was the either sex deer season and season extension. The evaluation of this appears in the completion report for Job II-A.

Submitted by:

Name Robert M. Blair

Title Junior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-36-R-5
DATE July 15, 1955
VOL. VI NO. 2

Title of Project: Lincoln County Deer Management Study

Leader: Robert M. Blair

Job Completion Report Job No. VII-A Investigations Project

Title of Job: Biology and Life History of White-tailed Deer

OBJECTIVES:

To collect, record and evaluate data on the habits, life history and biology of white-tailed deer and other big game species.

FINDINGS:

Inactive during report period. Material collected in relation to this job was incorporated into reports of other project studies as correlating factors.

Due to a mild winter all deer were widely dispersed and few winter behavior observations were made.

DISCUSSION:

Eleven bighorn mountain sheep were trapped from Wildhorse Island, Flathead Lake, and transplanted in the area between Quartz Creek and Kootenai Falls, Lincoln County. The composition of the transplant included four adult females, five female lambs and two male lambs. These animals will be periodically checked for success of transplant and herd development.

Both deer and elk utilize the area to some extent during the winter, hence, periodic evaluations will be made on the inter-specific competition for available range. Inasmuch as the localized area has been designated for the development of a mountain sheep herd this species will be given priority in range availability and continued welfare.

Submitted by:

Name Robert M. Blair

Title Junior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana		
PROJECT NO.	W-36-R-5		
DATE	July 15, 1955		
VOL.	VI	NO.	2

Title of Project: Lincoln County Deer Management Study

Leader: Robert M. Blair

Job Completion Report Job No. VIII-A Investigations Project

Title of Job: Relationships of Other Wildlife to White-tailed Deer

OBJECTIVES:

To determine the effect of mule deer and elk upon the white-tailed deer herds within the project area.

FINDINGS:

Inactive during report period. The lack of available time prohibited specific work on this phase of study.

DISCUSSION:

From field observations and various reports by Forest Service personnel and reliable sportsmen there is every indication that elk herds are increasing quite rapidly. Field signs show that elk have expanded their ranges considerably over the past few years and are now present on all white-tailed deer wintering areas. In some of these areas it is apparent that the elk are increasing in numbers to a point where they are in direct competition with the deer for available winter food.

RECOMMENDATIONS:

Due to the desirability of a greater portion of Lincoln County for the continued maintenance of white-tailed deer it is felt that immediate consideration should be given to the rapid increase of elk.

Department recommendations during the early stages of the Lincoln County Deer Study were that elk should not be permitted to increase beyond approximately 500 in total number. At the present time all indications are that the total population has now approached, and possibly even exceeded, twice that number in the project area.

Immediate steps should be undertaken to harvest this surplus of elk and reduce the population to a point where they are not

jeopardizing the continued welfare of wintering white-tailed deer herds. The overall condition of depleted forage on the overused winter ranges is within itself a major problem in relation to excessive deer herds. The annual continuation of an increase in elk populations which compete directly with the deer for food seriously hinders the solving of an already complex range problem.

In conjunction with measure to reduce elk populations by harvest, steps should be undertaken to periodically evaluate the degree of competition between the two big game species in the winter ranges.

Submitted by:

Name Robert M. Blair

Title Junior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana		
PROJECT NO.	W-41-R-6		
DATE	July 15, 1955		
VOL.	VI	No.	2

FINAL REPORT

For

SURVEY AND INVESTIGATIONAL PROJECTS

As Required By

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: Hunter Harvest Determination and Big Game Evaluation
2. Supervisors: A. A. O'Claire, State Fish and Game Director
Robert F. Cooney, Coordinator, Wildlife Restoration Division
Faye M. Couey, Assistant Coordinator, Wildlife Restoration Division
3. Leaders: Don L. Brown
Merle Rognrud
J. E. Gaab
Robert Blair
4. Checking Stations:

For a complete report of checking station operation in Western Montana and a detailed explanation of the findings of the same, reference is made to Completion Report for Job I-B entitled Big Game Harvest and Hunting, Project W-60-R-2 found in Quarterly Report Vol. VI, No. 1, 1955, pp. 90-111.

For a similar report for Eastern Montana reference is made to Job Completion Report for III-C, IV-A and V-A under W-59-R-2 of Quarterly Report Vol. VI, No. 1, 1955, pp. 71-84.

A report in Central Montana completing statewide coverage of hunter harvest by checking stations is found in this volume under W-35-R-6 Completion Report. As not all of the checking stations were covered, the final reports from all checking stations are herewith submitted.

FINAL REPORT
of
Bonner Checking Station
for 1954

Personnel: Wes. Woodgerd
 Art Whitney
 J. Ford
 Clyde Howard
 Merle Rognrud
 Phillip Marshall

Dates of Season: October 15 - November 15

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	46	50	8	13	17	134
Mule Deer	60	21	10	12	8	111
White-tailed Deer	102	103	17	29	28	279
Black Bear	4					4
Mountain Goat		2				2

Number of successful hunters checked - 517

Number of unsuccessful hunters checked - 1221

FINAL REPORT
of
Clover Creek Checking Station
for 1954

Personnel: Joe Townsend

Perry Nelson

Dates of Season: October 31, November 1 and 2

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk		14	3	2	2	21
Mule Deer	1	3	1	1		6

Number of successful hunters checked - 26

Number of unsuccessful hunters checked - 23

FINAL REPORT
of
Coram Checking Station
for 1954

Personnel: Jay Penney
Richard Motichka

Dates of Season: October 15 to November 15

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	98	126	18	25	28	295
Mule Deer	21				1	22
White-tailed Deer	7		1		3	11
Black Bear	2	1				3
Grizzly Bear	1					1
Mountain Goat	4	5				9

Number of successful hunters checked - 310

Number of unsuccessful hunters checked - 2563

FINAL REPORT
of
Corwin Springs Checking Station
for 1955

Personnel: D. S. Welker
Gordon Hinz

Dates of Season: January 1 to February 15

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	121	283	40	80	39	563

Number of successful hunters checked - 563

Number of unsuccessful hunters checked - 3,702

FINAL REPORT
of
Darby (Bitterroot) Checking Station
for 1954

Personnel: Fred Hartkorn
Melvin McNeal

Dates of Season: Elk - October 1 to October 15 in west half of West Fork
October 15 to November 15 in all of Ravalli County
November 15 to November 25 in east portion of Ravalli County
Deer- October 15 to November 15 entire county

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	91	72	17	18	32	230
Mule Deer	68	68	18	21	50	225
White-tailed Deer	2					2
Black Bear	2	2				4
Moose		2				2

Number of successful hunters checked - 463

Number of unsuccessful hunters checked - 1,122

FINAL REPORT
of
Elk Creek Checking Station
for 1954

Personnel: Wm. Bicket
George McCann
Jim Taylor

Dates of Season: October 15 - November 24

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	49	61	2	2	11	125
Mule Deer	323	145	62	40		570
White-tailed Deer	9	3				12
Black Bear	2					2
Sheep	1					1

Number of successful hunters checked - 700

Number of unsuccessful hunters checked - 578

FINAL REPORT
of
Hungry Horse Checking Station
for 1954

Personnel: Ernest G. Hatton

Dates of Season: October 15 to November 15

TOTAL GAME KILL						
<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	28	23	3	2	4	60
Mule Deer	2					2
White-tailed Deer	1					1
Grizzly Bear	1					1

Number of successful hunters checked - 60

Number of unsuccessful hunters checked - 686

FINAL REPORT
of
Island Lake Checking Station
for 1954

Personnel: William Boothman
John B. Dillon

Dates of Season: Oct. 15 - 30, incl. Bucks
Oct. 31 - Nov. 15, incl. Either Sex
Nov. 16 - Dec. 3, incl. Either Sex Extension

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	4				2	6
Mule Deer	13	10	2		1	26
White-tailed Deer	97	120	25	33	25	300
Black Bear	2	1				3

Number of successful hunters checked - 335

Number of unsuccessful hunters checked - 1623

FINAL REPORT
of
Mill Creek Checking Station
for 1954

Personnel: D. S. Welker
W. A. Rasor

Dates of Season: October 15 to November 25

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	33	21	6	7	7	74
Mule Deer	82	18	33	20		153
Black Bear	1					1
Mountain Goat		1				1
Moose	3	1				4

Number of successful hunters checked - 232

Number of unsuccessful hunters checked - 3041

FINAL REPORT
of
Ruby Checking Station
for 1954

Personnel: Frank E. Shryer

Dates of Season: October 15 to October 31 - Bucks Only
October 31 through December 31 - Hunters' Choice

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	37	76	17	22	16	168
Mule Deer	175	91	36	29	29	360
Black Bear	Age Unknown					1
Moose	5	3				8

Number of successful hunters checked - 512

Number of unsuccessful hunters checked - 1,674

FINAL REPORT
of
Squaw Creek Checking Station
for 1954

Personnel: Norman Wortman
 Richard Von Bergen
 B. F. Sinkovitz
 Gordon Hinz

Dates of Season: October 15 to January 18

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	98	252	62	69	49	530
Mule Deer	93	20				113
Sheep	9					9
Black Bear	8					8
Moose	5					5

Number of successful hunters checked - 623

Number of unsuccessful hunters checked - 6,688

FINAL REPORT
of
Sun River Checking Station
for 1954

Personnel: Earl Andridge
James McLucas

Dates of Season: October 15 to November 24

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	83	97	28	24	21	253
Mule Deer	132	56	18	5	9	220
White-tailed Deer	2	3				5
Black Bear		1				1
Sheep	16					16

Number of successful hunters checked - 448

Number of unsuccessful hunters checked - 751

FINAL REPORT

. of

Swan River Checking Station

for 1954

Personnel: Jim Browne

Dates of Season: October 15 to November 15

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	15	28	10	8	1	62
Mule Deer	1	1			1	3
White-tailed Deer	51	33	17	23	8	132
Black Bear			2			2
Grizzly Bear		1				1

Number of successful hunters checked - 200

Number of unsuccessful hunters checked - 824

FINAL REPORT
of
Waylett's Checking Station
for 1954

Personnel: Paul Stamschror
James Ramsey

Dates of Season: Oct. 15 - 30, incl. Bucks
Oct. 31 - Nov. 15, incl. Either Sex
Nov. 16 - Dec. 3, incl. Either Sex Extension

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	11				7	18
Mule Deer	12	9	2	4		27
White-tailed Deer	55	63	20	14	15	167
Black Bear		2				2

Number of successful hunters checked - 214

Number of unsuccessful hunters checked - 1226

FINAL REPORT
of
West Fork of Madison Checking Station
for 1954

Personnel: Ross Snyder
 Norman Wortman
 Todd & Sears

Dates of Season: October 31 to November 2

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	12	30	4	4	6	56
Mule Deer	7	7	1	3		18

Number of successful hunters checked - 71

Number of unsuccessful hunters checked - 89

FINAL REPORT
of
Blacktail Checking Station
for 1954

Personnel: Phil South
O. W. Lewis

Dates of Season: October 31, November 1 and 2

TOTAL GAME KILL

<u>Species</u>	<u>Adult Male</u>	<u>Adult Female</u>	<u>Young Male</u>	<u>Young Female</u>	<u>Spikes</u>	<u>Total</u>
Elk	16	52	6	15	11	100
Mule Deer	29	42	12	5		88

Number of successful hunters checked - 175

Number of unsuccessful hunters checked - 379

The stations were operated essentially as proposed in the Plans, Specifications and Estimates. In Western Montana additional project personnel were used on weekends to gather specific data for western Flathead County deer kill. The Lincoln County deer kill was checked under W-36-R-5 and reported similarly.

In Central Montana there was an additional area checked adjacent to the Ruby to supplement that station. It consisted of short term checks at Clover Creek and Blacktail Creeks principally on elk kill.

Eastern Montana as proposed consisted mostly in weekend checks whereby the necessary management data were obtained.

BIG GAME QUESTIONNAIRE:

A random sample of big game license holders was made to determine hunter success and location of kill for elk and deer hunters. Success of hunters of other big game was determined by 100 per cent samples.

There were 121,712 resident and 1,547 non-resident big game licenses sold in Montana during the 1954-55 fiscal year. During the same period there were permits for 20,886 antelope, 192 moose, 53 mountain sheep, 100 mountain goats and 3 bison. There were also 715 archery stamps sold during this season.

At the time of sending out the general big game questionnaire there were 119,319 big game hunter license stubs sampled.

ELK:

1954 Elk Hunter Report	
Your cooperation in filling out this card accurately will aid future management.	
I <u>HUNTED</u> elk in Area Number(s): _____ (mostly)	
I <u>KILLED</u> an elk in 1954: Yes <input type="checkbox"/> No <input type="checkbox"/> In Area _____	
I DID NOT HUNT ELK IN 1954: <input type="checkbox"/>	
Deer Killed: Yes <input type="checkbox"/> No <input type="checkbox"/>	
Remarks: _____	

Thank you.	

In order to more adequately sample the elk hunters an 11 per cent sample was made. Of this sample there was 49 per cent return. An analysis of

these returns indicates that 43 per cent of all big game license holders hunted elk and that 25.6 per cent of the elk hunters were successful. Applying these percentages to the total license holders results in a calculated statewide kill of 13,398 elk.

The deer kill question on these cards was asked merely to check with the other statewide deer kill statistics. Of the usable card return 55.7 per cent reported on the deer question and they indicate 70 per cent success in killing deer, 30 per cent being unsuccessful.

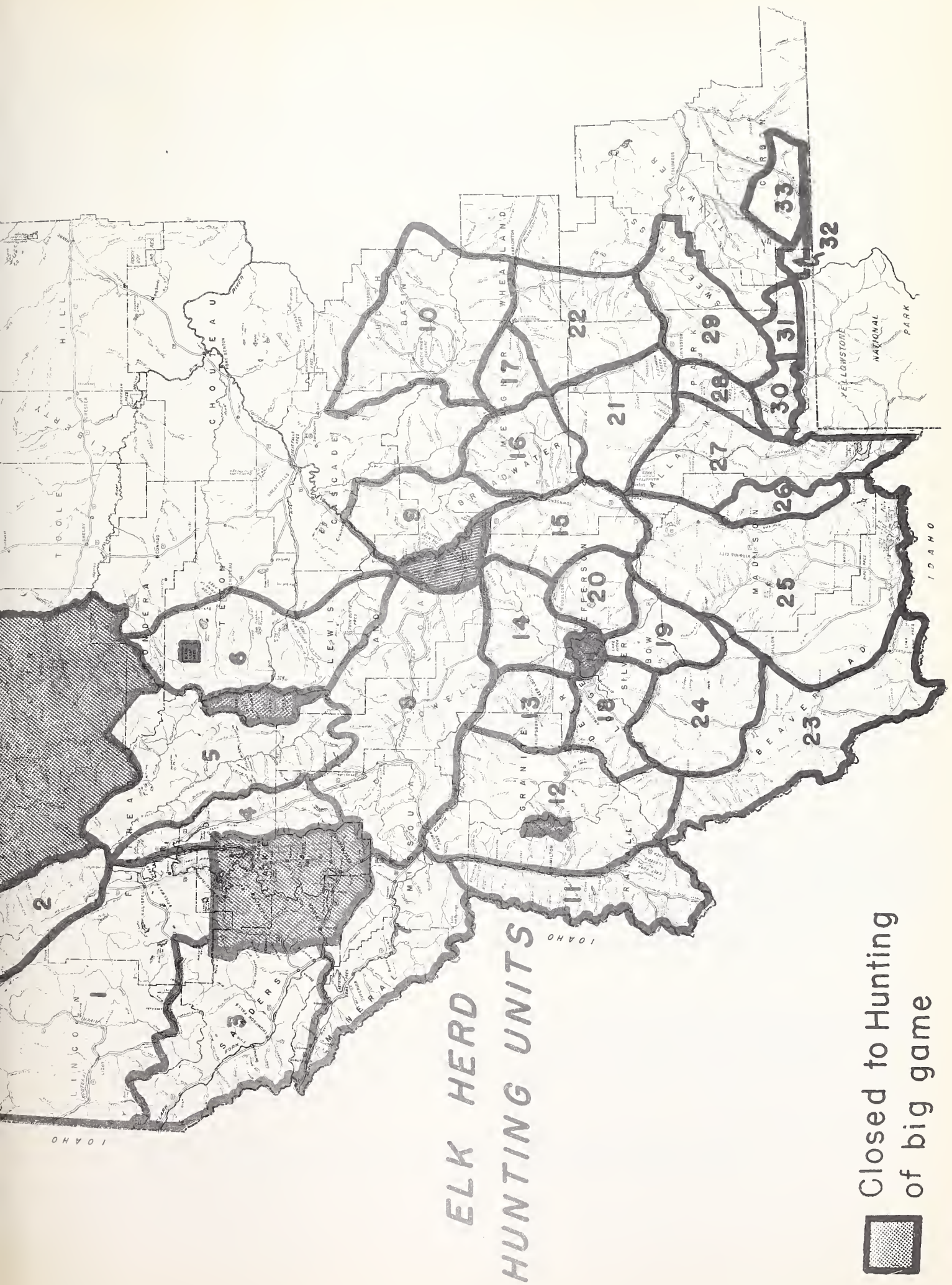
In order to determine hunter pressure on elk a map was prepared showing herd units and this was sent out with the questionnaire. This information received will be analyzed and used by the personnel in the various districts for management purposes.

DEER


1954 Deer Hunter Report		
I <u>HUNTED</u> deer in _____	_____ County.	
	(mostly)	
I <u>KILLED</u> a deer in 1954:	Yes <input type="checkbox"/>	No <input type="checkbox"/>
I DID NOT HUNT DEER IN 1954:	<input type="checkbox"/>	
Elk Killed:	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Remarks:	_____	

Thank you.		

An 8.3 per cent sample of the license holders was made to determine hunter success and kill by counties. There was a 44 per cent return. Analysis of these returns show that 92 per cent of the big game license holders hunted deer and that 75.3 per cent were successful. Applying these percentages to the total license holders results in a calculated statewide kill of 84,317 deer killed. No differentiation was made between species of deer. There was an elk kill of 8.7 per cent reported by these hunters.



ELK HERD HUNTING UNITS

 Closed to Hunting
of big game

ANTELOPE:

1954 Antelope Harvest		
	Area No. _____	
I killed a buck antelope	Yes <input type="checkbox"/>	No <input type="checkbox"/>
I killed a doe antelope	Yes <input type="checkbox"/>	No <input type="checkbox"/>
I did not kill an antelope	<input type="checkbox"/>	
Location:	_____	
Remarks:	_____ _____	

A sample of approximately 5 per cent was taken of antelope permit holders. In areas of light population a few heavy samples were taken. There was a 72 per cent return of these cards. Analysis of these cards showed a success of 82.7 per cent. Two per cent of them did not go hunting leaving 15 per cent who were unsuccessful. Permits were in most instances for either sex and card returns show that 67 per cent were bucks and 33 per cent does.

MOOSE:

There were 192 moose permits issued in 24 areas in the State. Ninety of these were for either sex, the rest being for mature bulls. Card questionnaires were sent to all moose hunters and there was an 87 per cent return. Analysis shows 72 per cent were successful and that 106 bulls and 38 cows were killed. Fourteen who hunted were unsuccessful.

MOUNTAIN GOATS:

There were 100 permits to hunt mature mountain goats in seven areas in the State. There was a 49 per cent return of these questionnaire sheets. Success was 51 per cent and kill was about equal between males and females.

Return on life history data, measurements and other management data were fair, but of sufficient value to repeat next year.

MOUNTAIN GOAT HUNTER REPORT

Name _____ Permit No. _____ Area No. _____

Address _____
(Street) (City) (State)

1. I killed a mountain goat. Yes _____ No _____
Male _____ Female _____

2. Location where goat was killed

(give detailed description)

3. Date of Kill_____

4. Number days spent hunting goats _____

5. Goats seen while hunting:

Date	Location	Adult	Young

6. Were any goats wounded that could not be recovered? Yes_____ No_____

If so, how many _____

7. What are the horn measurements of your animal? (Refer to Boone and Crockett Club system of measuring heads. A Department employee will assist you in making measurements if you desire.)

- A. Greatest spread _____ D. Circumference of base R _____ L _____
 B. Tip to tip spread _____ E. Circumference of 1st quarter R _____ L _____
 C. Length of horn R _____ L _____ F. Circumference of 2nd quarter R _____ L _____
 (Outside curve, base to tip) G. Circumference of 3rd quarter R _____ L _____

8. What was the hog-dressed weight of your animal Weighed _____
Estimated _____

9. Remarks: (Other big game seen, condition, etc.)

C U M U L A T I V E R E C O R D O F B I G G A M E D A T A

ESTIMATED POPULATION

1954-55

Management Unit	Elk	W.T. Deer	Mule Deer	Moose	Mtn. Sheep
Absaroka	625	-	3,200	160	55
Beartooth	290	350	6,500	47	100
Big Belt - Boulder	2,200	415	11,000	100	-
Big Hole - Monida	650	-	3,000	255	-
Bitterroot	2,098	595	2,960	295	20
Blackfoot	2,910	6,985	10,650	16	35
Blaine	92	150	5,900	-	-
Bridger - Crazy Mtns.	125	35	5,200	25	-
Carter	22	1,150	3,060	-	-
Cascade	430	350	6,000	-	-
Chouteau	365	40	5,500	-	-
Clark Fork	4,170	11,300	12,180	123	-
Custer	-	1,500	8,120	-	-
Deer Lodge	3,931	1,015	16,250	619	85
Ennis - Hebgen	225	-	1,725	100	40
Fergus	80	2,050	7,300	-	-
Flathead - Sun River	6,983	1,320	5,337	104	291
Gallatin	2,190	-	1,725	130	188
Glasgow	90	1,600	4,200	-	-
Glendive	-	1,300	1,500	-	-
Kalispell	585	8,000	1,075	70	-
Kootenai	1,385	21,200	9,600	700	345
Little Belts	1,456	805	26,750	11	-
Madison - Ruby	1,450	-	8,500	211	-
Missouri Breaks	40	1,080	4,000	-	120
Musselshell	-	300	4,500	2	-
Phillips	65	650	5,000	-	-
Polson	226	1,275	550	27	120
Poplar	-	3,050	900	-	-
Powder River	-	1,375	3,537	-	-
Sweet Grass Hills	75	8	800	-	-
Teton	-	210	1,275	-	-
Yellowstone	40	160	4,000	-	-
Blackfoot Ind. Res.	300	150	20	-	-
Crow-Cheyenne Ind. Reservation	5,000	300	4,500	-	-
Moiese Bison Range	90	170	264	-	38
Glacier Park	2,089	345	748	92	115
Yellowstone Nat'l Park	<u>11,500</u>	<u>-</u>	<u>600</u>	<u>-</u>	<u>189</u>
Total	51,777	69,233	197,926	3,087	1,741

C U M U L A T I V E R E C O R D O F B I G G A M E D A T A

ESTIMATED POPULATION

1954-55

Management Unit	Mtn. Goat	Ante- lope	Black Bear	Grizzly Bear	Bison
Absaroka		125	170	15	-
Beartooth	17	155	135	5	-
Big Belt - Boulder	20	712	110	1	-
Big Hole - Monida	35	305	75	-	-
Bitterroot	395	-	265	-	-
Blackfoot	230	-	510	43	-
Blaine	-	1,313	-	-	-
Bridger - Crazy Mtns.	225	665	90	-	-
Carter	-	7,000	-	-	-
Cascade	-	700	50	-	-
Chouteau	20	2,000	2	-	-
Clark Fork	160	-	825	20	-
Custer	-	8,418	-	-	-
Deer Lodge	662	325	410	4	-
Ennis - Hebgen	25	180	140	16	-
Fergus	-	2,700	5	-	-
Flathead - Sun River	1,190	100	595	140	-
Gallatin	12	-	92	2	-
Glasgow	-	1,900	-	-	-
Glendive	-	2,000	-	-	-
Kalispell	145	-	650	76	-
Kootenai	350	-	1,550	115	-
Little Belts	25	1,080	190	-	-
Madison - Ruby	-	1,158	180	-	-
Missouri Breaks	-	5,300	-	-	-
Musselshell	-	7,000	-	-	-
Phillips	-	2,500	-	-	-
Polson	110	10	134	31	-
Poplar	-	600	-	-	-
Powder River	-	4,326	-	-	-
Sweet Grass Hills	-	450	-	-	-
Teton	-	675	-	-	-
Yellowstone	-	7,500	-	-	-
Blackfoot Ind. Res.	15	100	100	25	-
Crow-Cheyenne Ind. Reservation	-	50	200	5	600
Moiese Bison Range	-	14	-	-	312
Glacier Park	800	-	400	100	-
Yellowstone Nat'l Park	-	-	-	-	-
Total	4,436	59,361	6,878	598	912

BIGHORN SHEEP:

A questionnaire similar to the one shown for goats was sent to each of the 53 permit holders in the five areas hunted. There was a 50 per cent return of the questionnaires and a card follow-up was sent to the remaining hunters of which 21 reported kills. There was 74 per cent success although the season was extended until December 12 in order to accomplish this. A similar number of permits is proposed for next year.

BISON:

Permits to take three bison were issued in the Slough Creek area just north of Yellowstone Park. All permittees were successful, but hunting was not easy. Continuance next year is questionable.

Self-registering stations were used as during the previous hunting season, but with less encouraging results. These results are reported under W-60-R-2 in Quarterly Report Vol. VI, No. 1, 1955, pp. 89.

Traffic counters were used successfully although those purchased under this project were delivered too late to be of service. A delay at the factory was the cause. This equipment will be used to advantage next year on roads connected with the regular checking stations.

Submitted by:

Name Faye M. Cooney

Title Ass't Coordinator

Approved by:

Montana State Fish and Game Department

By Robert F. Cooney, Coordinator

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-49-R-4
DATE	July 15, 1955
VOL.	VI NO. 2

Title of Project: Fur Resources Survey and Investigation

Leader: Fletcher E. Newby

Job Completion Report

Job No. II-A

Investigations Project

Title of Job: Beaver Population and Distribution Trends - Aerial Survey

ABSTRACT

The second annual beaver colony count was conducted in the fall of 1954. Total stream miles covered were 3,842; 3,014 colonies were recorded. An average of 1.3 miles per colony was indicated with variations of from 0.4 to 19.0. This index did not change from the 1953 colony count. The pattern of beaver population density and distribution as established by the 1953 survey did not show a significant change. A few beaver trapping areas were apparently affected by the General Beaver season of 1953-54, but no obvious overharvest was evident. The problem of high beaver densities and low number of trappers in the east was apparently not alleviated. The data suggest a general underharvest throughout the State during the 1953-54 season.

STATE	Montana	
PROJECT NO.	W-49-R-4	
DATE	July 15, 1955	
VOL.	VI	NO. 2

Title of Project: Fur Resources Survey and Investigation

Leader: Fletcher E. Newby

Job Completion Report Job No. II-A Investigations Project

Title of Job: Beaver Population and Distribution Trends - Aerial Survey

OBJECTIVES:

Determination of the annual trend of beaver populations and distributions.

INTRODUCTION:

This aerial survey was made in the fall of 1954. It is the second aerial beaver colony count; the first was made in the fall of 1953 and reported in the Wildlife Restoration Quarterly Report of July 15, 1954 (Vol. V, No. 2). Since Montana's first General Beaver Season (harvest results reported in Wildlife Restoration Quarterly Report of April 15, 1955 Vol. V, No. 4 and Vol. VI, No. 1) was declared for the 1953-54 trapping season, the present report should indicate any immediate changes in the general density pattern of Montana's beaver populations due to this season.

TECHNIQUES USED:

Methods used in this survey were identical with those reported for the 1953 colony count (Quarterly Report, July 15, 1954).

FINDINGS:

Total stream miles (map measure) covered were 3,842 (Figure 1); - 3,014 colonies were recorded. These figures give a statewide index of 1.3 miles per colony. Individual stream sections varied from 0.4 to 19.0. Comparative figures for 1953 were 3,499 miles, 2,672 colonies and 1.3 miles per colony with variations of from 0.4 to 13.5.

Beaver trapping areas were slightly changed and renumbered for the 1954-55 General Season. Figure 2 shows the 1954-55 Trapper Map.

Aerial colony count data and comparative 1953 figures are summarized in Tables 1, 2, 3 and 4 by beaver trapping area, major

MONTANA.

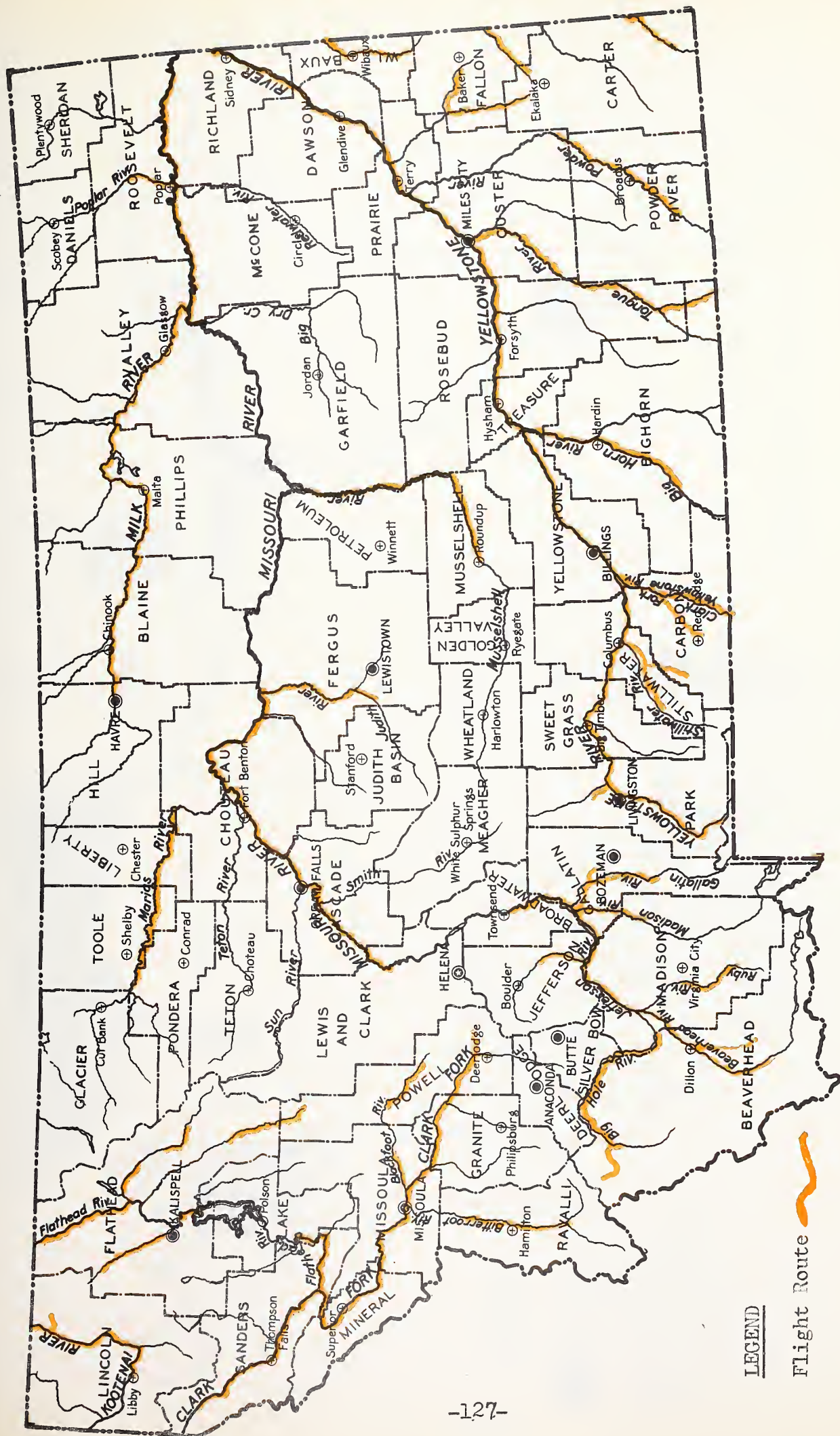
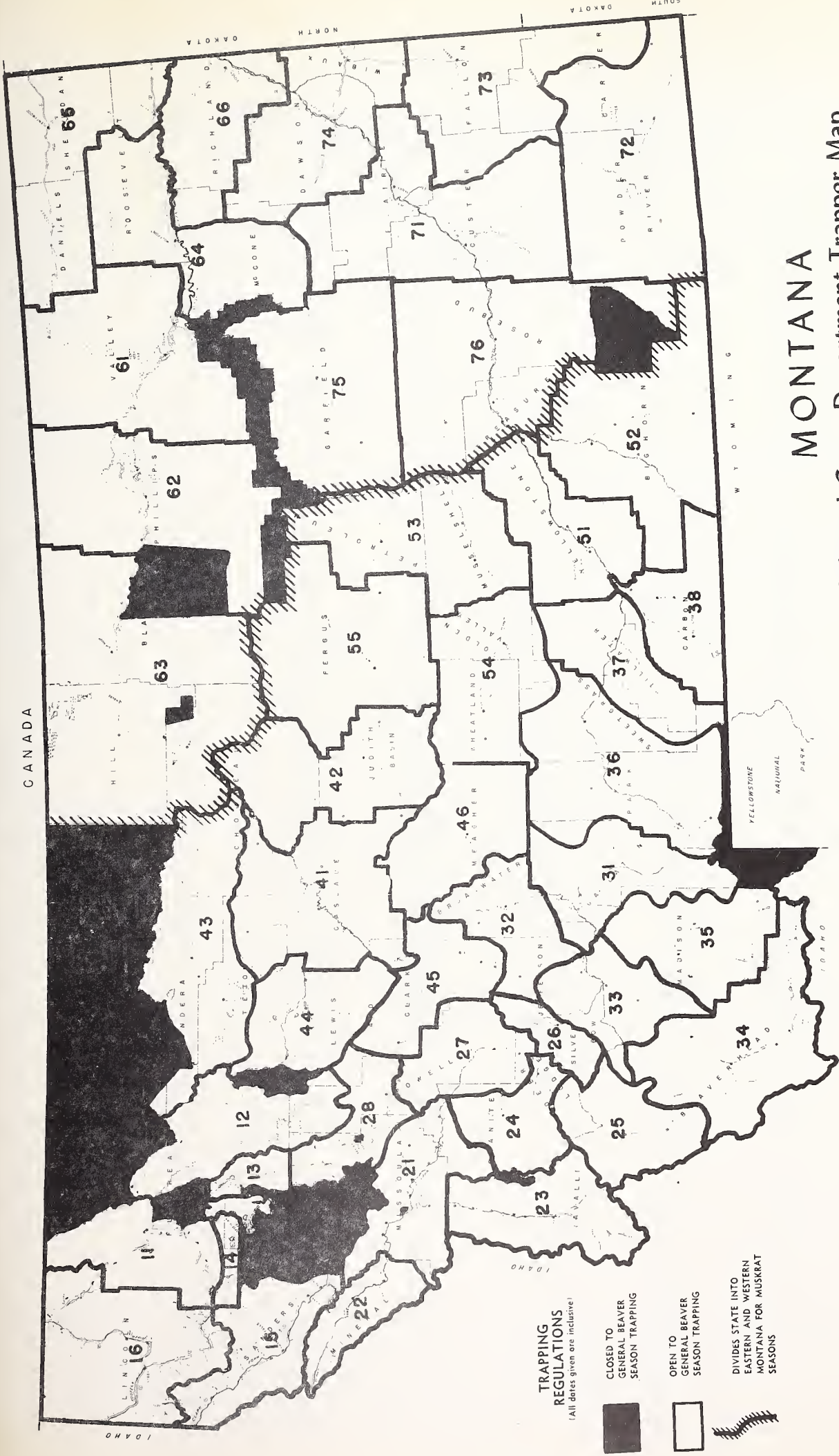


Figure 1. Aerial Beaver Colony Count Flight Routes - Fall 1954



MONTANA

Fish and Game Department Trapper Map

Figure 2. 1954-55 Trapper Map

TABLE 1

AERIAL COLONY COUNT BY BEAVER TRAPPING AREA, FALL 1954;
AND COMPARISON WITH THE COUNT OF FALL, 1953

Area		Stream Miles		Colonies		Miles Per Colony	
'53	'54	'53	'54	'53	'54	'53	'54
45 & 49	11	124	110	92	127	1.3	0.9
42,43,44	12	64 **	124	53	82	1.2	1.5
41	13	15	NC	11		1.4	
46	14		NC				
40	15	76	84	52	35	1.5	2.4
47 & 48	16	141	71	97	50	1.5	1.4
Flathead Closure		30	30	26	29	1.2	1.0
Flat. Ind. Res.		76 **	19	46	21	1.7	0.9
38	21	NC	131		73		1.8
39	22	63	70	29	12	2.2	5.8
37	23	68	80	19	15	3.6	5.3
36	24	25	NC	12		2.1	
32	25	115	80	111	90	1.0	0.9
35 *	27	49	64	36	31	1.3	2.1
34 *	28	95 **	33	50	19	1.9	1.7
19	31	147	118	93	84	1.4	1.4
?	32	60	49	41	33	1.5	1.5
?	33	95	95	54	77	1.8	1.2
29	34	74	101	26	37	2.8	2.7
28 *	35	72	72	21	48	3.4	1.5
20	36	140	140	60	109	2.3	1.3
21 *	37	117	117	117	116	1.0	1.0
22 *	38	122	122	62	48	2.0	2.5
6 *	41	44 **	132	20	93	2.2	1.4
7 *	42	NC	103		74		1.4
5 *	43	180 **	139	148	94	1.2	1.5
33	44	34 **	15	16	12	2.1	1.3
23	51	124	124	108	121	1.1	1.0
24 *	52	90	136	63	110	1.4	1.2
15	53	160	160	172	136	0.9	1.2
16	54	25	NC	27		0.9	
8 *	55	141 **	118	68	41	2.1	2.9
2	61	117	136	166	163	0.7	0.8
3	62	120	104	140	95	0.9	1.1
4 *	63	59 **	183	21	112	2.8	1.6
?***	64		186		120		1.6
1 *	65	80 **	47	53	34	1.5	1.4
10 *	66	78 **	205	74	169	1.1	1.2
13	71	184	137	149	105	1.2	1.3
25	72	100 **	61	139	77	0.7	0.8
26	73	185 **	146	175	171	1.1	0.9
11 & 12	74	67 **	156	74	184	0.9	0.8
14 *	76	238	241	201	241	1.2	1.0

* One or more stream sections mutual to two areas included.

** Flight routes of two years are not strictly comparable.

*** 1953 area not similar, count is not comparable.

? No comparable 1953 area, but comparable '53 sections used.

TABLE 2

AERIAL BEAVER COLONY COUNT BY MAJOR STREAM, FALL 1954;
AND COMPARATIVE 1953 COLONY COUNT INDEX

Streams and Sections 1954	Stream Miles 1954	Colonies 1954	Miles Per Colony	
			1954	1953
Big Hole River *				
Wisdom to Divide Dam	53	23	2.3	1.8
Divide Dam to Glenn	28	20	1.4	2.3
Glenn to Irr. dam in "Narrows"	<u>8</u>	<u>9</u>	<u>0.9</u>	<u>—*</u>
	89	52	1.7	1.7
Big Horn River				
Big Horn Canyon to Hardin	48	30	1.6	2.0
Hardin to Yellowstone River	<u>42</u>	<u>32</u>	<u>1.3</u>	<u>1.1</u>
	90	62	1.5	1.4
Bitterroot River *				
West Fork Brdg. to Corvallis Crossing	34	6	5.7	3.4
Corvallis Crossing to Stevensville Brdg.	34	6	5.7	3.8
Stevensville Brdg. to Florence Brdg.	<u>12</u>	<u>3</u>	<u>4.0</u>	<u>—*</u>
	80	15	5.3	3.6
Clark Fork River *				
Deer Lodge to Drummond	36	15	2.4	1.7
Drummond to Mouth of Rock Creek	34	24	1.4	—*
Mouth of Rock Creek to Bitterroot River	35	13	2.7	—*
Bitterroot River to Missoula County Line	31	34	0.9	—*
Missoula County Line to Superior	34	5	6.8	1.7
Superior to Mouth of Flathead River	36	7	5.1	*3.2
Mouth of Flathead to Thompson Falls	43	19	2.3	1.4
Thompson Falls to Noxon	<u>30</u>	<u>9</u>	<u>3.3</u>	<u>1.6</u>
	279	126	2.2	*1.7
Clark Fork of Yellowstone				
Wyoming Line to Mouth	67	24	2.8	2.3
Flathead River *				
Mouth to Agency	30	28	1.1	0.9
Holt Bridge to Red Bridge (above lake)	<u>30</u>	<u>29</u>	<u>1.0</u>	<u>1.2</u>
	60	57	1.0	*1.5
Gallatin River				
West Gallatin Mouth to Trident Brdg.	11	4	2.8	0.9

TABLE 2 (Continued)

Streams and Sections 1954	Stream Miles 1954	Colonies 1954	Miles Per Colony	
			1954	1953
Jefferson River				
Mouth of Big Hole River to South Boulder	35	35	1.0	2.2
Mouth of North Boulder to Missouri River	<u>31</u>	<u>23</u>	<u>1.3</u>	<u>1.2</u>
	66	58	1.1	1.6
Judith River *				
Hobson Brdg. to Wm. Springs Creek Mouth	23	18	1.3	—*
Wm. Springs Creek Mouth to Missouri	<u>52</u>	<u>14</u>	<u>3.7</u>	<u>4.3</u>
	75	32	2.3	—*
Kootenai River *				
Gateway to Jennings	51	39	1.3	1.2
Jennings to Libby	<u>13</u>	<u>4</u>	<u>3.3</u>	<u>1.3</u>
	64	43	1.5	*1.7
Little Missouri				
Capitol to Albion	42	55	0.8	0.7
Madison River				
Hot Springs Creek to Mouth	32	20	1.6	2.7
Marias River *				
Sullivan Brdg. to N.P. RR Brdg.	46	31	1.5	0.9
N.P. RR Brdg. to Turner Brdg.	42	29	1.4	1.0
Turner Brdg. to Tiber Dam	<u>19</u>	<u>6</u>	<u>3.2</u>	<u>—*</u>
	107	66	1.6	*1.0
Middle Fork of Flathead River *** *				
Gooseberry Park to Granite Creek	24	22	1.1	0.9
Bear Creek to Nyack	26	10	2.6	1.9
Nyack to West Glacier	<u>12</u>	<u>22</u>	<u>0.5</u>	<u>—*</u>
	62	54	1.1	*1.3
Milk River * **				
Havre to Chinook	34	26	1.3	—*
Chinook to Fort Belknap Brdg.	46	33	1.4	—*
Fort Belknap Brdg. to Dodson Brdg. (Hwy)	58	38	1.5	—*
Dodson Brdg. (Hwy) to Malta RR Brdg.	30	35	0.9	0.7
Malta RR Brdg. to Cree Crossing	41	40	1.0	0.9
Cree Crossing to Hinsdale	39	50	0.8	0.9
Hinsdale to Glasgow Brdg. S of town	35	45	0.8	*0.5
Glasgow to Mouth of Milk River	<u>62</u>	<u>67</u>	<u>0.9</u>	<u>*0.9</u>
	345	335	1.0	*0.8

TABLE 2 (Continued)

Streams and Sections 1954	Stream Miles 1954	Colonies 1954	Miles Per Colony 1954 1953	
Missouri River *				
Jefferson River Mouth to Townsend	42	48	0.9	1.0
Holder Dam to Cascade Brdg.	36	34	1.1	—*
Cascade to Ulm Brdg.	27	21	1.3	—*
Ulm to Mouth of Sun River	32	27	1.2	—*
Sun River to Carter Ferry	33	9	3.7	—*
Carter Ferry to Fort Benton Brdg.	19	14	1.4	—*
Fort Benton to Mouth of Marias River	32	28	1.1	—*
Marias River to Alkali Coulee	35	26	1.3	—*
Alkali Coulee to Judith River (PN Ferry)	<u>43</u>	<u>9</u>	<u>4.8</u>	<u>—*</u>
Fort Peck Dam to Frazer	32	17	1.9	—*
Frazer to Wolf P. - Circle Road	44	39	1.1	—*
Wolf P. - Circle Road to Popular R.	28	19	1.5	—*
Popular R. to Brockton	32	19	1.7	—*
Brockton to Culbertson-Sidney Road	32	23	1.4	—*
Culbertson-Sidney Road to Snowden RR Br.	<u>35</u>	<u>26</u>	<u>1.3</u>	<u>—*</u>
	502	359	1.4	*1.3
Musselshell River				
Roundup to Musselshell	41	32	1.3	0.9
Musselshell to Melstone	26	15	1.7	1.0
Melstone to Mosby Brdg.	44	36	1.2	*0.9
Mosby Brdg. to Game Range Boundary	36	40	0.9	0.9
Game Range to Mouth	<u>13</u>	<u>13</u>	<u>1.0</u>	<u>0.9</u>
	160	136	1.2	0.9
North Fork of Flathead River				
Canadian Border to Coal Creek	35	50	0.7	1.2
Coal Creek to Mouth	<u>28</u>	<u>27</u>	<u>1.0</u>	<u>1.5</u>
	63	77	0.8	1.3
Powder River				
Powderville Brdg. to Bay Horse Creek	61	77	0.8	0.8
South Fork of Flathead River & Danaher Creek				
Spotted Bear to White River	32	4	8.0	—*
White River to Basin Creek	19	12	1.6	—*
Basin Creek to Upper End of Danaher Creek	<u>11</u>	<u>12</u>	<u>0.9</u>	<u>—*</u>
	62	28	2.2	—*

TABLE 2 (Continued)

Streams and Sections 1954	Stream Miles 1954	Colonies 1954	Miles Per Colony	
			1954	1953
Stillwater River				
From #93 Brdg. North of Upper Stillwater lake to #93 Brdg. 12 miles South of Spencer Lake	47	50	0.9	1.6
Tongue River				
Mouth to Brandenburg Brdg.	77	67	1.1	1.4
Ashland to Birney	36	52	0.7	1.6
Birney to Wyoming Line	<u>46</u>	<u>48</u>	<u>1.0</u>	<u>2.3</u>
	159	167	1.0	1.6
West Gallatin River				
Williams Brdg. to Mouth	35	13	2.7	2.1
Yellowstone River				
Gardiner to Livingston	68	42	1.6	2.5
Livingston to Billings	149	161	0.9	1.0
Billings to Custer	97	98	1.0	1.2
Custer to Forsyth	95	74	1.3	1.2
Forsyth to Miles City	64	67	1.0	0.8
Miles City to Glendive	100	84	1.2	1.3
Glendive to North Dakota State Line	<u>105</u>	<u>111</u>	<u>0.9</u>	<u>1.0</u>
	678	637	1.0	1.1
* - Stream section or sections not exactly comparable with 1953 data.				
-* - No comparable data for 1953.				
*** Mistake in 1953 data: Gooseberry Park to Granite Creek is 24 s. miles				
** Milk River total figures directly comparable with those of 1953 are				
from Dodson to Mouth, - - - - -	207	237	0.9	0.8

TABLE 3

AERIAL COLONY COUNT 1954 AND COMPARATIVE 1953
INDEX BY FUR DISTRICT

Fur District	Miles	Colonies	Miles/Colony	1953 Index
				Miles/Colony
1	816	494	1.6	1.6
2	15	12	1.2	1.3
3	843	610	1.4	1.6
4 *	250	134	1.9	1.9
5	568	519	1.1	1.1

TABLE 3 (Continued)

Fur District	Miles	Colonies	Miles/Colony	1953 Index Miles/Colony
6	433	462	0.9	1.0
7 *	521 (194)**	442 (210)**	1.2 (0.9)**	1.0
8 *	866 (344)**	664 (314)**	1.3 (1.1)**	1.0

* Figures of fur districts 4, 7 and 8 are not directly comparable since this years colony count includes a great deal of the Missouri River not previously counted.

** Figures comparative to the 1953 data (1954 additions deleted).

TABLE 4

AERIAL BEAVER COLONY COUNT BY BEAVER TRAPPING DISTRICT

District Number	Miles	Colonies	Miles Per Colony 1954	Miles Per Colony 1953
1	438	344	1.3	1.4
2	443	229	1.9	1.6
3	763	520	1.5	1.8
4 *	321	225	1.4	1.4
5 *	538	408	1.3	1.2
6 *	734	606	1.2	1.0
7 *	741	778	1.0	1.0

* Includes some stream sections mutual to two or more districts.
Districts 4, 5 and 6 include stream miles not used in 1953, and thus are not exactly comparable.

stream, fur district (Figure 3 - established in Wildlife Restoration Quarterly Report, July - September, 1952) and 1953-54 beaver trapping district (Figure 4 - established in Wildlife Restoration Quarterly Report, April 15, 1955) respectively.

DISCUSSION:

The inclusion of many stream miles (particularly of the Missouri River) not flown in 1953 has, in some areas of the State, given a slightly different density index than would otherwise be noted. Generally, however, the data show no significant change in density or distribution of beaver populations from the 1953 survey (Tables 3 and 4).

Again the highest densities are indicated in the eastern part of

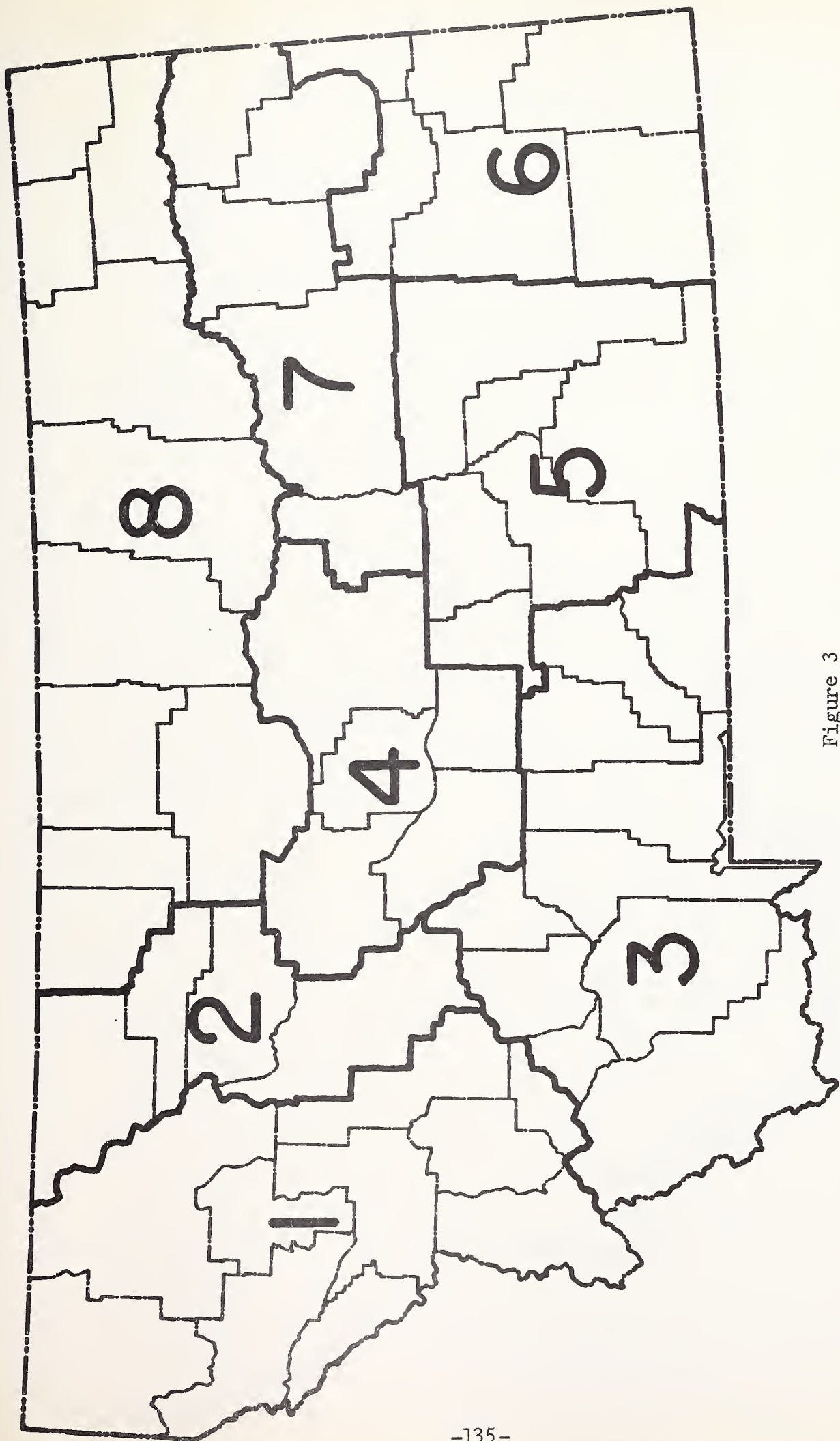


Figure 3

FUR DISTRICTS

MONTANA.

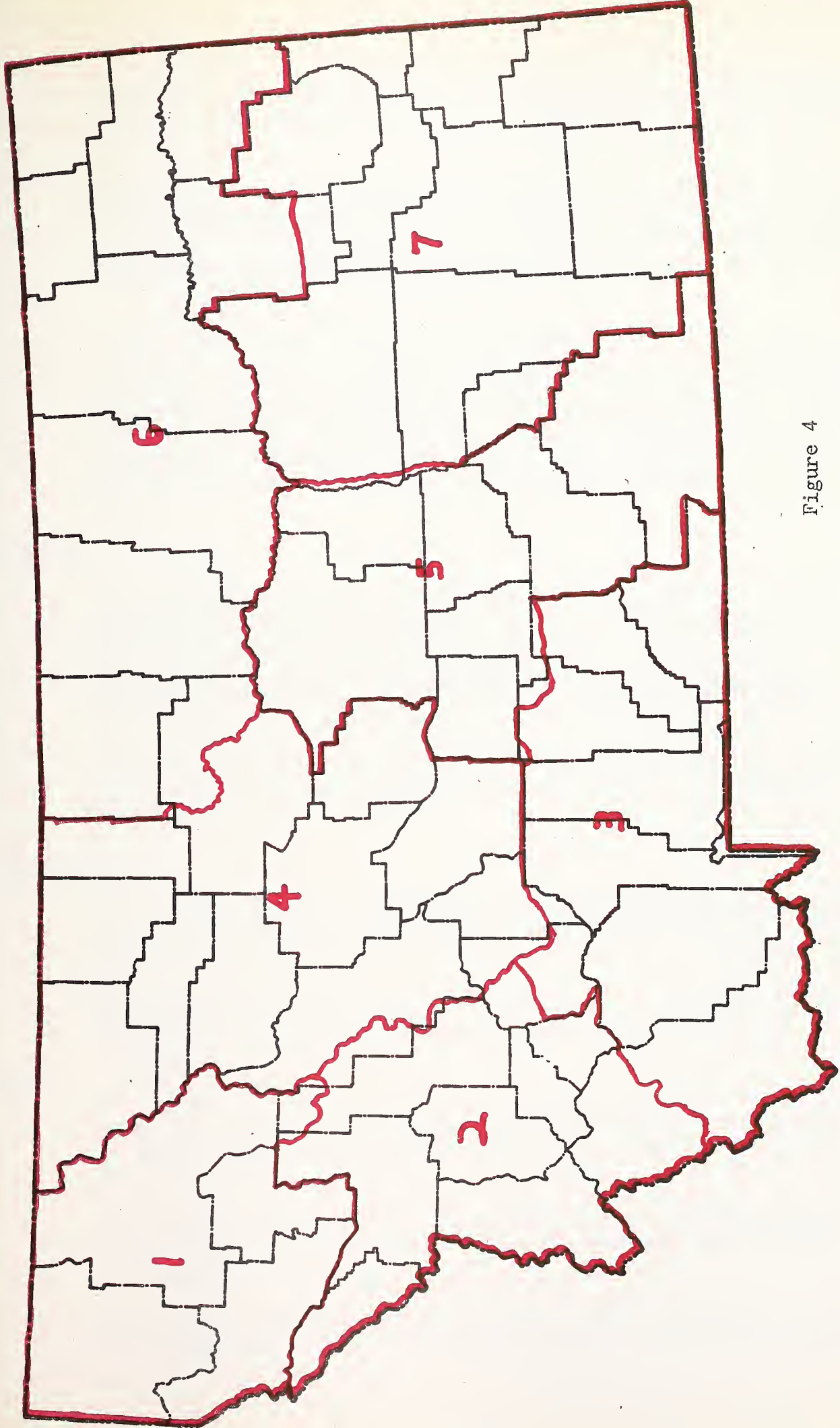


Figure 4
Beaver Trapping Districts

the State. These populations were apparently not reduced, despite the increased harvest reported in the April 15, 1955 Quarterly Report.

Significant changes in population density are suggested in a few beaver trapping areas (Table 1). Those showing a definite increase in population are Areas 11, 33, 35 and 36. An index indicating a decrease in population was apparent for Areas 15, 22, 23 and 27. No area was obviously overharvested.

In the aerial colony count report for 1953, a density index of 1.0 mile per colony was noted as a saturated or near saturated condition. Since a great share of that colony count approximated this index, an over populated condition generally existed. The present data show no great change. Thus, an overpopulation apparently still existed in the fall of 1954, indicating that the beaver season of 1953-54 did not sufficiently harvest the population.

CONCLUSIONS:

The statewide picture of our beaver population density and distribution as reported in the July 15, 1954 Wildlife Restoration Quarterly Report (W-49-R-3, Job II-A) was not significantly changed by the 1953-54 Beaver Season. Thus, the high beaver densities in the east, coupled with few trappers operating in these areas, still cause a problem of inadequate harvest.

Although a few areas show significant population changes, no area was obviously overharvested. Actually, the data show a general underharvest.

RECOMMENDATIONS:

The statewide aerial colony count should be continued to provide us with an index to population fluctuations and a check on beaver management programs.

Emphasis should still be placed on obtaining an adequate beaver harvest in the eastern end of the State.

SUMMARY:

The second annual beaver colony count was conducted in the fall of 1954. Total stream miles covered were 3,842; 3,014 colonies were recorded.

An average of 1.3 miles per colony was indicated with variations of from 0.4 to 19.0. This index did not change from the 1953 colony count.

The pattern of beaver population density and distribution as established by the 1953 survey did not show a significant change.

A few beaver trapping areas were apparently affected by the General Beaver season of 1953-54, but no obvious overharvest was evident.

The problem of high beaver densities and low number of trappers in the east was apparently not alleviated.

The data suggest a general underharvest throughout the State during the 1953-54 season.

Submitted by:

Name Joe Townsend

Title Biologist

Approved by:

Name Fletcher Newby

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Wynn G. Freeman, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-49-R-4
DATE	July 15, 1955
VOL.	VI NO. 2

Title of Project: Fur Resources Survey and Investigation

Leader: Fletcher E. Newby

Job Completion Report

Job No. II-C

Investigations Project

Title of Job: Beaver Ecology in the Jefferson Basin

ABSTRACT

Data on beaver movements were obtained from 40 captures of 18 beaver from July 1 to September 25, 1953 and March 24 to December 13, 1954 on two mountain streams in southwest Montana. The principle vegetative types were woody shrub, meadow and coniferous forest. Five study areas, each approximately one-half mile long, were selected. Beaver were live-trapped, weighed, measured, sexed, ear-tagged and released at site of capture (two were transplanted). An attempt was made to steel-trap all beaver in the fall of 1954. All beaver were aged by methods described by Townsend (1953). Findings indicated variations in colony composition from two-year-old pairs to mature colonies consisting of a pair of adults, yearlings and kits. Spring movement of two-year-old beavers from their "home" colony site apparently occurred before the latter part of April. The possibility of two two-year-olds "taking over" part of a previously occupied colony site, and the relations of this behavior to population density was indicated. An instance of adult male summer movement was noted. Age of kits able to survive without the adult female was tentatively suggested to be between two and four months. A possible case of yearling breeding was indicated. Recommendations were to continue the study, but with only the two most productive areas.

STATE	Montana		
PROJECT NO.	W-49-R-4		
DATE	July 15, 1955		
VOL.	VI	NO.	2

Title of Project: Fur Resources Survey and Investigation

Leader: Fletcher E. Newby

Job Completion Report

Job No. II-C

Investigations Project

Title of Job: Beaver Ecology in the Jefferson Basin

1953-54 BEAVER MOVEMENT SEGMENT

OBJECTIVES:

Formulation of a management plan for the beaver of Montana based upon information provided by an intensive survey of a selected area.

INTRODUCTION:

Data on beaver movements were obtained from 40 captures of 18 beavers from July 1 to September 25, 1953 and March 24 to December 13, 1954 on two mountain streams, Sheep Creek and Bloody Dick Creek, in Beaverhead County, Montana.

Sheep Creek originates from tributaries which drain a basin of about 150 square miles. It flows through narrow canyons, interrupted by hay meadows and valley floor, for about 16 miles before entering the Red Rock River at Dell, Montana. The gradient from the origin (elevation*, 6,940) to the mouth (elevation, 6,155) is 51 feet per mile. Volume flow taken 6 miles above the mouth in May, 1954 (floating chip and watch method) was 56 cubic feet per second.

The width of the flood plain ranged from a few feet to about 300 yards. Dominant vegetation on the flood plain varied from woody shrubs to meadow grasses. The woody shrubs in the order of abundance were; willow (Salix spp.), water birch (Betula occidentalis), red osier dogwood (Cornus stolonifera), rose (Rosa acicularis), and currant (Ribes spp.). Representative grasses included: inland giant wildrye (Elymus cinereus), timothy (Phleum pratense), slender wheatgrass (Agropyron trachycaulum), foxtail barley (Hordeum jubatum), redtop (Agrostis alba), bluestem (Agropyron smithii), and needle-and-thread (Stipa comata). Other plants commonly occurring in local

*Elevations were estimated from U. S. Forest Service maps.

situations were Canada thistle (Cirsium arvense), iris (Iris missouriensis), thermopsis (Thermopsis montana), and goldenrod (Solidago elongata).

The lower slopes of the Sheep Creek valley were characterized by big sage (Artemisia tridentata) and rabbit brush (Chrysothamnus nauseosus) locally interspersed with curlleaf mountain mahogany (Cercocarpus ledifolius). The coniferous forest of the upper slopes was chiefly Douglas fir with scattered limber pine (Pinus flexilis).

Bloody Dick Creek originates from Swift Lake (elevation, 8,010) and flows through a narrow valley for approximately 19 miles before entering Horse Prairie Creek (elevation, 6,110). The latter stream joins the Red Rock River one mile north of Armstead to form the Beaverhead River. Volume flow taken 6 miles below the source in May, 1954 was 21 cubic feet per second. The stream gradient is about 67 feet per mile.

Big sage was the dominant plant on the lower slopes of the Bloody Dick Creek valley near its mouth. Midway up the valley it was replaced in dominance on the lower slopes by lodgepole pine (Pinus contorta). The vegetation on the upper slopes was principally lodgepole pine with scattered Douglas fir and alpine fir (Abies lasiocarpa). Engleman spruce was found on some of the higher stream banks.

Most of the flood plain was less than 300 yards in width. The lower one-half only was used for hay meadows and pasture for cattle. The selection of study areas was confined to the upper segment where there was little disturbance and beaver were abundant. Mountain meadows were typical of the wider portions of the flood plain in this region. Willow was the predominant woody shrub. Beaked sedge (Carex rostrata) and aquatic sedge (Carex aquatilis) were the dominant emergent aquatics. Some of the major grasses were northern reedgrass (Calamagrostis inexpansia), alpine foxtail (Alopecurus alpinus), foxtail muhly (Muhlenbergia andina), beardless wheatgrass (Agropyron inerme) and redtop.

TECHNIQUES USED:

Five segments of the flood plains (one-half mile or more in length) were selected as study areas. Three were located on Sheep Creek, two on Bloody Dick Creek.

Vegetative cover maps of the study areas were prepared on enlarged aerial photo tracings and cross-indexed for aid in recording field observations. Beaver ponds, lodges and canals were plotted on the cover maps.

Beavers were captured with both Hancock and Bailey live-traps. Three types of trap sets were used: bait, runway and dam. The bait set consisted of scent (beaver castoreum) and/or fresh food

(aspen or willow). Traps were set in the vicinity of apparent beaver activity. Captured animals were ear tagged. They were aged (kits, yearlings and two-year olds or older) on the basis of the weight categories established for beavers in western Montana by Townsend (1953). Animals older than kits were sexed by the presence or absence of a baculum.

An attempt was made to steel-trap all beavers on the study areas at the conclusion of the study. Trapping was continued until no animals were caught for at least three days and no evidence of beaver activity was apparent. If no "sign" appeared within the following week, the areas were assumed to be trapped out.

FINDINGS:

Study Area I was located in a livestock pasture on Sheep Creek, 3.5 miles above the mouth. The stream length within the study area was about 2,190 yards. Its width averaged 24.5 feet.

"Old" beaver cuttings were observed on parts of the study area but no conspicuous structures (dams, lodges, ponds, or canals) were present. "Fresh" cuttings appeared in July, 1953 on the lower end of the area only. Evidence of "fresh" cuttings disappeared by August. No further "fresh sign" was observed until September, 1954, when "fresh" cuttings were again noted near the lower end.

Two beavers, a male and a female, were caught here in steel-traps in November, 1954. Both were aged as two-year-olds. One had previously been live-trapped twice as a yearling on Study Area II (August 29 and September 20, 1953). The age of these beavers and the time of year suggest early colony formation (Townsend, 1953).

Study Area II was located within a pasture 2 miles upstream from Study Area I. The stream section within the study area was about 2,085 yards long and averaged 24.4 feet in width.

Twelve beavers were live-trapped and marked here during the two summers (seven were captured during August and September, 1953 and five during April and May, 1954.) Information on movements was obtained from 14 recaptures and one tagged animal found dead.

Four yearlings were live-trapped and marked in 1953; three on August 29 and one on September 20. One of these was recaptured in the same vicinity (about 60 yards upstream) on September 20, 1953, and steel-trapped four stream miles downstream on November 7, 1954 on Study Area I (previously mentioned.) Another was steel-trapped in late April, 1954, 4.5 stream miles downstream. The remaining two were steel-trapped on the study area as two-year-olds on October 25, 1954. One (a female) showed a downstream movement of about 260 yards; the other (a male) was taken at the site of original capture.

Recaptures of "coming" yearlings showed no movement away from the study area. Three were originally trapped in April and May, 1954

and recaptured on the area in late October, 1954 as yearlings. One had moved 220 yards downstream, another 210 yards upstream and the third 150 yards upstream.

Three two-year-old females were live-trapped and marked. Recaptures of two indicated movements away from the study area. One, live-trapped on September 26, 1953, was steel-trapped in late April, 1954 about five miles downstream. The other, live-trapped on May 11, 1954, was recaptured about two miles downstream on December 13, 1954. The third female was live-trapped on April 27 and April 28 on the extreme upper end of the study area and found dead there on May 12.

An adult male was captured September 20, 1953 on the lower end of the study area. Subsequent recaptures and distances from the original site of capture were as follows: September 23, 1953, 480 yards upstream; May 19, 1954, 120 yards upstream; October 24, 1954, 770 yards upstream.

On August 29, 1953 an adult female (showing conspicuous mammae) was captured. No recaptures of this animal were made.

Study Area III was located in a hay meadow 10.5 miles upstream from Study Area II. The stream length within the study area was about 1,500 yards. Its width averaged 8.6 feet.

Three beaver impoundments were present on the stream in September, 1953. Two, located near the upper end of the area, impounded little water and showed no sign of beaver occupancy in 1953 or 1954. Fresh dam repairs, willow cuttings, tracks and observations of beavers indicated occupancy of the impoundment near the lower end of the area in 1953. Two beavers were seen there regularly during evening observations in June and early July, 1954. On July 17, 1954 a dam appeared in an irrigation ditch about 100 yards above the lower pond. A two-year-old male was live-trapped there three nights later. The following night an adult suckled female (conspicuous mammae) was live-trapped in the lower pond. Both beavers were transplanted away from the area and no "fresh sign" appeared following their removal.

Study Area IV was located on Bloody Dick Creek, about six miles below its source. The stream length within the study area was about 1,770 yards. Its width, (excluding beaver ponds) averaged 8.9 feet.

Five beaver impoundments were present on the stream section in 1954, all in the upper one-half of the study section. An adult male was live-trapped four times (May 4, 6, 7 and September 1, 1954) in the two lower ponds which were about 50 yards apart. An adult female and a kit were live-trapped in one of these ponds on May 6 and September 1, 1954 respectively. All three of these beavers were steel-trapped in the same pond between October 30 and November 6, 1954.

Study Area V was located 3.5 miles upstream from Study Area IV. The stream length within the study area was 1,265 yards. Its width (excluding beaver ponds) averaged about 9 feet. A total of 35 beaver impoundments were present either on the stream or on canals adjacent to the stream.

Two, two-year-old female beavers were live-trapped in ponds on the upper one-third of the area on September 10, 1953. One was recaptured in the same pond on the following night. In addition, an adult male and a yearling male were captured about 100 yards downstream in another pond. Both died in the traps. A dead kit was found in this pond on the following day. Ages of the latter beavers suggest a colony site. The two two-year-olds were not recaptured, possibly suggesting movement from the study area.

A two-year-old male was live-trapped in a pond at the extreme lower end of the area on September 18, 1953. He was recaptured in another pond about 300 yards upstream on May 29, 1954. Two beavers (one tagged) were seen there and in surrounding ponds during some observations through May, June and July. The tagged male was steel-trapped at the site of the recapture on November 6, 1954. Little assurance could be placed on the complete removal of beavers by steel-trapping due to the irregularity of visits to the area during trapping operations.

DISCUSSION AND CONCLUSION:

The colony composition noted during the two years corroborate the findings of Bradt (1938), Townsend (1953) and others. The data from Area I suggests a colony composed of two two-year-old beaver, male and female. The histories of Areas II and V indicate mature colonies consisting of a pair of adults, kits and yearlings. Colonies composed of adults and kits were apparently indicated in Areas III and IV.

The pattern of movement for age classes and sex during various times of the year, as noted in this study, corroborates and adds to the findings of Bradt and Townsend.

Two-year-old movement from the "home" colony site is substantiated. Actual period of movement is apparently suggested by the record of Area II, where two "strange", "coming" two-year-olds were trapped during late April and early May, and when one "coming" two-year-old traveled 4.5 miles downstream before the latter part of April. Townsend (1953) found three "coming" two-year-olds in "transient" status after the 10th of April. Two-year-old movement from the colony site, apparently occurred before the latter part of April in these instances.

Two two-year-olds (in Area II) indicated very little movement. The possibility of these two (probably from the same litter) forming a "new" colony and taking over a share of the previous year colony's area is recognized. Burt (1943) indicated that

reduction of home range due to population pressure was possible. Townsend (1953) cited Burt and gave a possible example of this occurrence in a beaver population.

The summer movement of adult males as described by Townsend (1953) and suggested by Bradt (1938) was possibly noted in Area II. Captures of an adult male in Area IV did not suggest "transient" or "wandering" status in May or September. An adult male in Area V was trapped apparently in the following winter's colony site on the 29th of May. Possibly, the latter two animals did not begin extended movements until after May.

Recaptures of three "coming" yearlings in Area II indicated no movement from the study area.

Information on early male breeding and kit survival was obtained in Area III. Captures and observations in Area III suggest the possibility of a yearling male breeding. The presence of kits is also indicated in Area III. The data suggest forced abandonment of these kits in July caused their death. Townsend (1953) found kit survival despite the death of the adult female in October. Possibly, kit survival without the adult female is possible between the ages of two to four months.

RECOMMENDATIONS:

To formulate intelligent beaver management programs, the factual, quantitative information gathered annually should be carefully analyzed in the light of population and individual behavior. Administration of a beaver management program, to be accomplished intelligently, must be executed with a good understanding of basic population dynamics. Without these basics, management cannot progress. Thus, it is recommended that this study be continued.

Continuation of this study should be limited to the two most productive areas, II and IV.

Emigration of beaver into these "trapped out" areas should be carefully checked and noted.

Past and future live-trapping data should be evaluated with topographical and vegetative information in an effort to obtain data on "carrying capacity" factors of various types.

SUMMARY:

1. Data on beaver movements were obtained from 40 captures of 18 beavers from July 1 to September 25, 1953 and March 24 to December 13, 1954 on two mountain streams in southwest Montana.
2. The principle vegetative types were woody shrub, meadow and coniferous forest.

3. Five study areas, each approximately one-half mile long, were selected.
4. Beaver were live-trapped, weighed, measured, sexed, ear-tagged and released at site of capture (two were transplanted). An attempt was made to steel-trap all beaver in the fall of 1954.
5. All beaver were aged by methods described by Townsend (1953).
6. Findings indicated variations in colony composition from two-year-old pairs to mature colonies consisting of a pair of adults, yearlings and kits.
7. Spring movement of two-year-old beavers from their "home" colony site apparently occurred before the latter part of April.
8. The possibility of two two-year-olds "taking over" part of a previously occupied colony site, and the relations of this behavior to population density was indicated.
9. An instance of adult male summer movement was noted.
10. Age of kits able to survive without the adult female was tentatively suggested to be between two and four months.
11. A possible case of yearling breeding was indicated.
12. Recommendations were to continue the study, but with only the two most productive areas.

LITERATURE CITED:

Bradt, G. W. 1938. A study of beaver colonies in Michigan.
Jour. Mamm., 19:139-162.

Burt, W. H. 1943. Territoriality and home range concepts
as applied to mammals. Jour. Mamm., 24:346-352.

Townsend, J. E. 1953. Beaver ecology in western Montana with
special reference to movements. Jour. Mamm., 34:459-479.

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STATE Montana
PROJECT NO. W-49-R-4
DATE July 15, 1955
Vol. VI NO. 2

Title of Project: Fur Resources Survey and Investigation

Leader: Fletcher E. Newby

Job Completion Report Job No. II-D Investigations Project

Title of Job: Beaver-Waterfowl Relationships in the Jefferson Basin

Objectives: Quantitative determination of the relationships between beaver and waterfowl on selected areas of headwater streams in the Jefferson Basin.

*Abstract: A study of beaver-waterfowl relations in a mountainous habitat was conducted July 1 to September 25, 1953 and March 24 to October 5, 1954 on three streams in Beaverhead County, Montana. Eight segments of the flood plains of one-half mile or more in length were selected as study areas. Data were obtained by observations on waterfowl and live-trapping, steel-trapping, and observations of beaver (Castor canadensis). Waterfowl usage of the study areas was correlated with the presence of beavers and beaver ponds. Beaver ponds used by waterfowl were evaluated against the remainder of the ponds as concerns surface area, relative depth, and presence of emergent aquatics. The importance of the ponds to waterfowl is discussed in relation to the remainder of the stream.

* Report entitled "A Study of Beaver-Waterfowl Relations in the Mountainous Area of Beaverhead County, Montana" has been submitted separately.

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STATE	Montana		
PROJECT NO.	W-49-R-4		
DATE	July 15, 1955		
VOL.	VI	NO.	2

Title of Project: Fur Resources Survey and Investigation

Leader: Fletcher E. Newby

Job Completion Report

Job No. II-E

Investigations Project

Title of Job: Mink Age and Sex Ratios

OBJECTIVES:

To determine an osteological aging criteria from known age mink which will be reliable for analyzing age and sex ratios from a sample of the wild mink harvest.

INTRODUCTION:

Several trappers have expressed a desire to reduce or close the trapping season for minks in their area. These opinions are based upon the observation of less sign, noticeable trapping competition and reduced catches over previous years. Information from correspondence and a survey of the literature reveals a very limited number of states showing a semblance of techniques with supported evidence for inventory, analysis and applications to mink management. In view of this, it will behoove a state with controversial mink populations to initiate an intensive investigation to achieve this purpose. The economic status of the minks in Montana (Wildlife Restoration Division Quarterly Report, January - March, 1955) indicates a warrant for valid management of this species.

The use of the baculum for determining juvenile and adult mink has been established (Petrides, 1950; Elder, 1951). It is still necessary to have a means for distinguishing female age classes and a report of the presence or absence of the suprasesamoid tubercle on the femur (Lechleitner, 1954) proved promising. The present study is directed toward obtaining valid aging criteria for female minks.

TECHNIQUES USED:

The 1953 representation of known aged mink specimens were collected principally from one rancher while efforts were directed in obtaining adult age classes from several ranchers during the 1954 season.

The major bones retained from each specimen included: skull, atlas, axis, presternum, scapula, humerus, radius, ulna, pelvic girdle, sacrum, femur, fibula, tibia and baculum.

A dermestid beetle colony was utilized for reducing specimens to skeletal remains. Several bone boards were made to establish a reference for the relative criteria existing among and between age classes. Bones were analyzed and findings recorded on marginal punch cards.

FINDINGS:

Eight mink ranchers supplied a total of 883 known aged specimens (Table 1). Major bones between age classes (juvenile and adult) were analyzed for clearly perceived differences. Bones exhibiting a relative degree of demarcation between age classes were: baculum, femur, skull and pelvic girdle. The other bones were considered inadequate for age correlation although some did exhibit fine features of distinction. Unbleached specimens were more desirable for analysis. Parturition for ranch mink in Montana ranges from the last of April through early May. Pelting periods vary between the last of November through early December. Known aged juvenile specimens are therefore considered to be eight months old while adults are one year eight months, two years eight months, etc.

TABLE 1. KNOWN AGE SPECIMENS

Age	1953		1954		TOTAL	
	Males	Female	Males	Female	Male	Female
$\frac{1}{2}$ yr.	230	265	---	---	230	265
$1\frac{1}{2}$ yr.	29	100	18	108	47	208
$2\frac{1}{2}$ yr.	6	4	6	55	12	59
$3\frac{1}{2}$ yr.	4	5	3	42	7	47
$4\frac{1}{2}$ yr.	---	1	1	2	1	3
$5\frac{1}{2}$ yr.	---	---	---	3	---	3
$6\frac{1}{2}$ yr.	1	---	---	---	1	---
TOTAL	270	375	28	210	298	585
JUV	230	265	---	---	230	265
AD	40	110	28	210	68	320

Baculum

By baculum conformation only, 99.5 per cent of the sample (230) of juvenile male specimens was correctly classified as juveniles and all adult male specimens were readily declared adults.

Femurs

A relative criteria (absent, small, medium, large) was established to aid in classification of the supra-sesamoid tubercle on each femur. A line of separation of classes is apparent and femurs falling within the absent or small categories are considered to have the tubercle absent while the femurs in a medium or large category have the tubercle present. For the final analysis, where a femur was missing from a specimen (lost during preparations) the tubercle was classified as having the same prominence as its counterpart..

The critical level of separation is between juveniles ($\frac{1}{2}$ yr.) and yearlings ($1\frac{1}{2}$ yr.). Assuming the above common boundary as a segregation of juveniles and yearlings it is found that 92.5 per cent of the juvenile and yearling known age specimens are correctly classified. The data (Table 2) indicated juveniles (93.5 per cent) were correctly classified more frequently than yearlings (90.6 per cent). Although the yearling male sample is smaller than other classes, it appears that the males show a greater incidence for a femoral tubercle being present than females. (Figures 1, 2 and 3).

Considering the $2\frac{1}{2}$ year and older groups, 93.9 per cent are classified as adults while 92.9 per cent adult females and 100 per cent adult males fall within the boundary of adults. Combining all age classes, 819 or 92.8 per cent of the total specimens (883) are within the respective categories of juvenile and adults by using the absence or presence of the femoral tubercle, only. Adult males (95.6 per cent) occurred more frequently than adult females (90.9 per cent).

In a few instances, epiphyses were evident on unbleached juvenile male specimens.

Skull

Three sutures were evident in the known age sample: nasal-premaxillary, maxillary, frontal suture; mastoid-exoccipital suture; and jugal-zygomatic process of squamosal suture. All sutures were not well defined, with hair line distinction, as usually found in larger mammals. With the appearance of ossification progressing to the outer surfaces, some sutures were recognized as a groove or impression. There were several instances where only a segment of an entire suture could be discerned in the immediate area. It was common for the middle or ventral section of the jugal suture to be the last remnant. When the nasal-premaxillary suture was faint but evident the apparent difference, or color tone, of the nasal and

TABLE 2

KNOWN AGE SPECIMENS CLASSIFIED WITHIN RESPECTIVE CATEGORY OF JUVENILE AND/OR ADULT

Age Class	Total No.	STATUS OF FEMUR TUBERCLE, ONLY (Fig. 1, 2 and 3).		STATUS OF JUGAL-SQUAMOSAL SUTURE, ONLY (Fig. 4, 5, and 6).		ABSENCE OR PRESENCE OF FEMUR TUBERCLE AND JUGAL-SQUAMOSAL SUTURE (Fig. 7, 8 and 9).	
		Number	Per Cent	Number	Per Cent	Number	Per Cent
$\frac{1}{2}$ yr. Male (Juvenile)	230	215	93.5	220	95.7	220	95.7
$\frac{1}{2}$ yr. Female (Juvenile)	265	248	93.6	253	95.5	248	93.6
All Juveniles	495	463	93.5	473	95.6	468	94.7
$1\frac{1}{2}$ yr. Male (Yearling)	47	<u>PRESENT</u> 44 93.6		<u>ABSENT</u> 40 85.1		43	91.5
$1\frac{1}{2}$ yr. Female (Yearling)	208	187	89.9	180	86.5	199	95.7
All Yearlings	255	231	90.6	220	86.3	242	94.9
$2\frac{1}{2}$ yr. and older, Male	21	21	100.0	21	100.0	21	100.0
$2\frac{1}{2}$ yr. and older, Female	112	104	92.9	111	99.1	112	100.0
All $2\frac{1}{2}$ yr. and older	133	125	93.9	132	99.2	133	100.0
$1\frac{1}{2}$ yr. and older, Male	68	65	95.6	61	89.7	64	94.1
$1\frac{1}{2}$ yr. and older, Female	320	291	90.9	291	90.9	311	97.2
All $1\frac{1}{2}$ yr. and older (Adults)	388	356	91.8	352	90.7	375	96.6
All Juveniles and all Yearlings	750	<u>ABSENT (JUV), PRESENT (AD)</u> 694 92.5		<u>PRESENT (JUV), ABSENT (AD)</u> 693 92.40		710	94.7
All Juveniles and all Adults	883	819	92.8	825	93.4	843	95.5

FIGURE 1

OCCURRENCE OF FEMUR TUBERCLE ON JUVENILES AND YEARLINGS

RIGHT FEMUR

	ABSENT			PRESENT		
	Absent	Small	Medium	Large	Lost	
ABSENT	(182 210	(1) Abs Abs 4	(9) Abs Sm 5	(3) Abs Med 3	(6) Abs Lg 2	(6) Abs Lost 2
	(5 8	(1) Sm Abs 2	(10) Sm Sm 19	(2) Sm Med 1	(2) Sm Lg 2	(2) Sm Lost 1
ADULT	(1 1	(1) Med Abs 1	(1) Med Sm 9	(6) Med Med 11	(2) Med Lg 2	(2) Med Lost 2
	(-- --	(-- Lg Abs --	(-- Lg Sm 1	(1) Lg Med 3	(33) Lg Lg 128	(33) Lg Lost 2
PRESENT	(3 1	(-- Lost Abs --	(-- Lost Sm 1	(1) Lost Med --	(1) Lost Lg 1	(1) Lost Lost --

SAMPLE:

CORRECTLY CLASSIFIED:

1/2 yr. Male (Juv) - (230) 1 1/2 yr. Male (Yearling) - (47) Juveniles-463 (93.5) Yearling-231 (90.6)
1/2 yr. Fem. (Juv) - (265) 1 1/2 yr. Fem. (Yearling) - (208) Juv. Male-215 (93.5) Year.Male-44 (93.6)
Juv. Fem.-248 (93.6) Year.Fem.-187 (89.9)
Juvenile and Yearling - 694 (92.5)

FIGURE 2

OCCURRENCE OF FEMUR TUBERCLE ON 2½ YEARS AND OLDER CLASSES

RIGHT FEMUR

	PRESENT				Lost
	Absent	Small	Medium	Large	
ABSENT	Abs Abs	Abs Sm	Abs Med	Abs Lg	Abs Lost
		2 1	1 1		
	Sm Abs	Sm Sm	Sm Med	Sm Lg	Sm Lost
	1	3 1	1 1	1 1	
JUVENILE					
ADULT	Med Med	Med Sm	Med Med	Med Lg	Med Lost
		1	9 11		
PRESENT	Lg Abs	Lg Sm	Lg Med	Lg Lg	Lg Lost
	2		3 1	10 (6) (2)	37 29 4
	Lost Abs	Lost Sm	Lost Med	Lost Lg	Lost Lost

SAMPLE:

CORRECTLY CLASSIFIED:

2½ yr. Male - 12
 3½ yr. Male - 7
 4½-6½ yr. Male - 2

2½ yr. Female - 59
 3½ yr. Female - 47
 4½-6½ yr. Female - 6

2½ yr. Male and Older - 21 (100.0)
 2½ yr. Female and Older - 104 (92.9)
 Male and Female - 125 (93.9)

FIGURE 3

OCCURRENCE OF FEMUR TUBERCLE ON ALL AGE CLASSES

RIGHT FEMUR

	ABSENT			PRESENT		
	Absent	Small	Medium	Large	Lost	
Absent	(182 210 392 . . .)	(1) 4 5 . . .)	(3) Abs Med . . .)	— Abs Lg . . .)	(6 2 8 . . .)	Abs Lost . . .)
Small	(5 8 13 . . .)	(10 19 29 . . .)	(2) 1 3 . . .)	— Sm Lg . . .)	— 2 2 . . .)	Sm Lost . . .)
JUVENILE						
ADULT						
Medium	(1 1 2 . . .)	(1) 10 11 . . .)	(6) 11 17 . . .)	(2) Med Lg . . .)	— Med Lost . . .)	— Med Lost . . .)
Large	— — — .	— — — .	— — — .	(2) 3 5 . . .)	— — — .	Lg Lost . . .)
PRESENT						
Lost	(3 1 4 . . .)	— Lost Sm . . .)	(1) Lost Med . . .)	— Lost Lg . . .)	— Lost Lost . . .)	— Lost Lost . . .)

SAMPLE:

Juv. Male - (230) Ad. Male - (68)
 Juv. Fem. - 265 Ad. Fem. - 320
 All Juv. - 495 All Adult - 388

CORRECTLY CLASSIFIED:

Juveniles - 463 (93.5) Adults - 356 (91.8)
 Juv. Male - 215 (93.5) Ad. M. - 65 (95.6)
 Juv. Fem. - 248 (93.6) Ad. F. - 291 (90.9)
 Juvenile and Adults - 819 (92.8)

LEFT FEMUR

joining bones offered a contrast.

The nasal suture was discernible in 61.3 per cent juvenile males, 41.1 per cent juvenile females and 1 specimen ($1\frac{1}{2}$ yr. male) of 388 adults.

The mastoid-exoccipital suture was conspicuous in all age groups and of no value as an aging criteria.

The jugal-squamosal suture appeared to show merit for separation of juveniles (present) and adults (absent); 93.4 per cent are within their respective categories. By using this suture, 95.6 per cent juveniles and 86.3 per cent yearling are correctly separated. There appears to be very little difference between sexes of the same age groups with this criteria (Figs. 4, 5 and 6.)

The sagittal crest was considered incomplete if the temporal ridges were apparent in the parietal region of skull. These ridges prevent the occurrence of a distinct crest from point of origin, fusion on frontal bones, to occipital crest. It was usual to find an undeveloped crest in the juvenile females (75.5 per cent) but this condition also existed in the adult classes (Table 3). Males exhibited a more positive development, 11.3 per cent had temporal ridges. The absence, presence or prominence of the sagittal crest had no value as aging criteria. The feature did not show any significant difference among ranches where specimens were obtained.

TABLE 3

INCIDENCE OF INCOMPLETE SAGITTAL CRESTS

<u>MALE</u>				<u>FEMALE</u>			
Age Group	Sample	Incomplete	%	Age Group	Sample	Incomplete	%
$\frac{1}{2}$ yr.	230	26	11.3	$\frac{1}{2}$ yr.	265	200	75.5
$1\frac{1}{2}$ yr.	47	1	2.1	$1\frac{1}{2}$ yr.	208	76	36.5
$2\frac{1}{2}$ yr. & older	21	0	—	$2\frac{1}{2}$ yr. & older	112	10	8.9

All juveniles had a tendency for the sagittal area to have a gritty or sandpaper aspect and a finger rubbed over this surface confirmed the impression. Adults usually inferred a smooth appearance and polished sensation.

Fisher and Mackenzie (1954) prepared transparent sections from lower canine mink teeth. Most sections had faint and definable

FIGURE 4

OCCURRENCE OF JUGAL-SQUAMOSAL SUTURE OF ZYGOMATIC ARCH ON JUVENILES AND YEARLINGS

RIGHT ZYG. SUT.
PRESENT

	Absent		Faint		Distinct		Broken	
Absent	(10)	(39)	(9)	(3)				(1)
	12	178	30	12				1
ADULT								
JUVENILE								
Faint	(6)	(1)	(118)	(3)	(19)			
	13	7	122	8	29		1	
PRESENT								
Distinct	(1)	--	(9)	--	(58)			
	--	--	9	--	48			
Broken	--	--	--	--				
	--	--	1	--				

LEFT ZYG. SUT.

SAMPLE:

$\frac{1}{2}$ yr. Male (Juv) - (230

$\frac{1}{2}$ yr. Fem. (Juv) - 265

$\frac{1}{2}$ yr. Male (Yearling) - (47)

$\frac{1}{2}$ yr. Fem. (Yearling) - 208

CORRECTLY CLASSIFIED:

Juvenile - 473 (95.6)

Juv. M. - 220 (95.7)

Juv. F. - 253 (95.5)

Yearling - 220 (86.3)

Year. M. - 40 (85.1)

Year. F. - 180 (86.5)

Juvenile and Yearling - 693 (92.4)

FIGURE 5

OCCURRENCE OF JUGAL-SQUAMOSAL SUTURE OF ZYGOMATIC ARCH ON 2½ YEARS AND OLDER CLASSES

RIGHT ZYG. SUT.

PRESENT

	Absent	Faint	Distinct	Broken
Absent	12 7 (2)	58 47 16	1 Abs Fa Abs Dist	Abs Brok
JUVENILE				
Faint	Fa Abs	Fa Fa	Fa Dist	Fa Brok
Distinct	Dist Abs	Dist Fa	Dist Dist	Dist Brok
Broken	Brok Abs	Brok Fa	Brok Dist	Brok Brok

LEFT ZYG. SUT.

SAMPLE:

2½ Male - 12 2½ Fem. - 59
 3½ Male - 7 3½ Fem. - 47
 4½-6½ M. - (2) 4½-6½ F. - 16

CORRECTLY CLASSIFIED:

2½ yr. male and older - 21 (100.0)
 2½ yr. fem. and older - 111 (99.1)
 Male and Female - 132 (99.2)

FIGURE 6

OCCURRENCE OF JUGAL-SQUAMOSAL SUTURE OF ZYGOMATIC ARCH ON ALL AGE CLASSES

RIGHT ZYG. SUT.

		Present		Broken	
		Faint	Distinct		
		Absent			
Absent	ADULT	(10) 12 .22	(60) 289 349 ...	(9) 30 39 ...	(3) 13 16 ...
		(10) 12 .22	(60) 289 349 ...	(9) 30 39 ...	(3) 13 16 ...
Faint	JUVENILE	(6) 13 19 ...	(1) 7 8 ...	(118) 122 240 ...	(3) 8 11 ...
		(6) 13 19 ...	(1) 7 8 ...	(118) 122 240 ...	(3) 8 11 ...
Distinct		(1) -- .1	-- -- --	(9) 9 18 ...	-- -- --
		(1) -- .1	-- -- --	(9) 9 18 ...	-- -- --
Broken		-- -- --	-- 1 .1	-- 1 1	-- 1 1
		-- -- --	-- 1 1	-- 1 1	-- 1 1

LEFT ZYG. SUT.

PRESENT

SAMPLE:

Juv. Male - (230) Ad. Male - (68)
 Juv. Fem. - 265 Ad. Fem. - 320
 All Juv. - 495 All Ad. - 388

CORRECTLY CLASSIFIED:

Juvenile - 473 (95.6) Adult - 352 (90.7)
 Juv. Male - 220 (95.7) Ad. Male - 61 (89.7)
 Juv. Fem. - 253 (95.5) Ad. Fem. - 291 (90.9)
 Juvenile and Adult - 825 (93.44)

annuli but the limited sample did not reveal obvious correlation with known age specimens.

Skull and Femur

By combining both features, absence or presence of tubercle on femur and jugal-squamosal suture, the incidence for proper identification of 883 juveniles and adults was 843 or 95.5 per cent. The juvenile (94.7 per cent) and yearling (94.9 per cent) classes are about equal for correct classification. Juvenile males appeared with a higher percentage of correct classification than juvenile females whereas a reversal of predominance occurred between sexes in the adult class. These criteria allowed 97.2 per cent of 320 adult females to be properly designated while the independent use of femur and suture show their respective frequency to be the same, 90.9 per cent.

The dividing line designated in Figures 7, 8 and 9 allows an asymmetrical pattern but offered the highest incidence for correct classification of the total sample than any other delineation. The four central combinations have observations insignificant in affecting totals and permitted an easier interpretation for classification.

If:

- A - Tubercle absent on both femurs
and
Suture absent on both zygomatic arches -- adult
- B - Tubercle present on either femur
and
Suture absent on either zygomatic arch -- adult
- C - All other combinations -- juvenile

Pelvic Girdle

The pelvic girdle did not reveal evident sutures between the elements (ilium, ischium, pubis) of an innominate bone. Differences that did exist on the internal and external pubic symphysis were: distinct suture between innominate bones; external pubic symphysis ossified; bone deposits along pubic symphysis, pubis corner and ischium edge; and bone nodule and/or ossification of internal pubic symphysis. No correlation could be found for the erratic variations that existed in the ossification of pubic symphysis and reproductive history of specimens.

The ischium edge, forming the posterior extremity of the pelvic girdle, offered a means of separating a juvenile from adult, male only. The juvenile appears with a smooth conforming edge whereas the adults have a bulbous and bursting or cauliflower aspect from additional deposits on the ischium edge. The growth is apparant in the yearlings and becomes more pronounced with increased age. This feature was recognized on all adult males and absent on all juvenile males.

DISCUSSION:

Petrides (op. cit.) and Elder (op. cit.) have established the use

FIGURE 7

OCCURRENCE OF FEMUR TUBERCLE AND ZYGOMATIC SUTURE ON JUVENILES AND YEARLINGS

FEMUR L&R

	Absent	Absent	Absent	Present	Present	Absent	Present
(Ab Ab)	(8	Ab Ab (Ab Ab)	(3)	(1	Ab Pr (Ab Ab)	--	(1
	<u>10</u>		<u>21</u>	--			(37)
ADULT							
JUVENILE							
(Ab Pr)	(9	Ab Ab (Ab Pr)	--	--	Pr Ab (Ab Pr)	--	--
	<u>28</u>		--	--			(3)
				--			<u>11</u>
(Pr Ab)	(7	Ab Ab (Pr Ab)	--	--	Pr Ab (Pr Ab)	--	--
	<u>10</u>		--	--			<u>5</u>
	(191		--	(4		(2	(4)
(Pr Pr)	<u>200</u>	Ab Ab (Pr Pr)	--	<u>1</u>	Ab Pr (Pr Pr)	<u>1</u>	
							<u>8</u>

ZYG (L&R)

SAMPLE:

$\frac{1}{2}$ yr. Male (Juv) - (230
 $\frac{1}{2}$ yr. Fem. (Juv) - 265
 $1\frac{1}{2}$ yr. Male (Yearling) - (47)
 $1\frac{1}{2}$ yr. Fem. (Yearling) - 208

CORRECTLY CLASSIFIED:

Juveniles - 468 (94.7) Yearlings - 242 (94.9)
Juv. Male - 220 (95.7) Year. Male - 43 (91.5)
Juv. Fem. - 248 (93.6) Year. Fem. - 199 (95.7)
Juvenile and Yearling - 710 (94.7)

FIGURE 8

OCCURRENCE OF FEMUR TUBERCLE AND ZYGOMATIC SUTURE ON 2½ YEARS AND OLDER

FEMUR L&R

	Absent	Absent	Absent	Present	Present	Present	Present
	Absent	Absent	Absent	Present	Absent	Present	Present
(Ab Ab)	---	---	---	1	3	11	48
ADULT	Ab Ab	Ab Pr	Ab Pr	---	---	7	143
	(Ab Ab)	(Ab Ab)	(Ab Ab)	---	---	(2)	151
JUVENILE	---	---	---	---	---	---	---
(Ab Pr)	---	---	---	---	---	---	1
	Ab Ab	Ab Pr	Ab Pr	---	---	---	---
	(Ab Pr)	(Ab Pr)	(Ab Pr)	---	---	---	---
(Pr Ab)	---	---	---	---	---	---	---
	Ab Ab	Ab Pr	Ab Pr	---	---	---	---
	(Pr Ab)	(Pr Ab)	(Pr Ab)	---	---	---	---
(Pr Pr)	---	---	---	---	---	---	---
	Ab Ab	Ab Pr	Ab Pr	---	---	---	---
	(Pr Pr)	(Pr Pr)	(Pr Pr)	---	---	---	---

ZYG. L&R

SAMPLE:

CORRECTLY CLASSIFIED:

2½ yr. Male - 12 2½ yr. Female - 59 2½ yr. Male and Older - 21 (100.0)

3½ yr. Male - 7 3½ yr. Female - 47 2½ yr. Fem. and Older - 112 (100.0)

4½-6½ yr. Male - (2) 4½-6½ yr. Female - 161 Male and Female - 133 (100.0)

OCCURRENCE OF FEMUR TUBERCLE AND ZYGOMATIC SUTURE ON ALL AGE CLASSES

ZYG LER

CORRECTLY CLASSIFIED:

Juv. Male	- (230)	Adult Male	- (68)	Juvenile	- 468 (94.5)	Adult	- 375 (96.6)
Juv. Fem.	- <u>265</u>	Adult Fem.	- <u>320</u>	Juv. Male	- 220 (95.7)	Ad. Male	- 64 (94.1)
All Juv.	- <u>495</u>	All Adult	- <u>388</u>	Juv. Fem.	- 248 (93.6)	Ad. Fem.	- 311 (97.2)
				Juvenile and Adult	- 843 (95.3)		

of the baculum for determining juvenile and adult minks. The validity of baculum conformation is further substantiated in this study. Retention of male skeletons was necessary for a control in confirming aging criteria before application to the female.

Juvenile bacula exhibited a mode of development into the adult configuration. Variations existed in formation of the ridge, point of attachment for the corpus cavernosum penis, by appearance of a bony protuberance. Seventy-four were bare (B) of any bone deposit, 69 showed a dorsal (D) development, 8 on right (R) side and none of left (L) side. Twelve had deposits on D R L, 65 with D R and 2 on R L. More than two-thirds of the juvenile sample had protuberances on the dorsal and right side. This seems to indicate the dorsal keel to appear first followed by a nodule occurring on the right side and continued growth elongates deposits on all surfaces to form the adult ridge.

Lechleitner (op. cit.) suggests that the absence of the supra-sesamoid tubercle on one femur to indicate a juvenile but if present, an adult. This study utilized both femurs and 87.6 per cent of the total sample exhibited the tubercle prominence to have the same interpretation (abs. abs., sm. sm., med. med., lg. lg.). When single femurs were accorded a similar value to the missing mate, 90.5 per cent of all specimens had paired values. By consolidation into absent (abs. and sm.) and present (med. and lg.) grouping 9.5 per cent displayed opposite values for femur prominence, of which 50 per cent were adult females (Fig. 10, Table 4).

FIGURE 10

ABSENT AND PRESENT CLASSIFICATION OF THE FEMUR TUBERCLE

		RIGHT FEMUR			
		Absent		Present	
LEFT FEMUR	Absent	(215 <u>248</u> ..463	Ab Ab <u>29</u> ..32	(5 <u>1</u> ..6	Ab Pr <u>11</u> ..11
	JUVENILE				
	ADULT				
	Present	(2 <u>1</u> ..3	Pr Ab <u>14</u> ..15	(8 <u>15</u> ..23	Pr Pr <u>266</u> 330

SAMPLE:

Juvenile Male	- (230	Adult Male	- (68)
Juvenile Female	- <u>265</u>	Adult Female	- <u>320</u>
All Juveniles	- <u>495</u>	All Adults	- <u>388</u>

TABLE 4

PAIRED AND UNPAIRED VALUES FOR THE FEMUR TUBERCLE

	<u>PAIRED</u>							<u>UNPAIRED</u>								
	<u>ABSENT</u>				<u>PRESENT</u>			Total	%	Pr	Ab	Ab	Pr	Total	%	
	Ab	Ab	Sm	Sm	Med	Med	Lg									Lg
Juvenile Male (230)	191		10		6		2		209	90.9	7		14		21	9.1
Juvenile Female (265)	213		22		11		3		249	93.9	9		7		16	6.0
Adult Male (68)	1		1		8		53		63	92.6	2		3		5	7.4
Adult Female (320)	5		16		54		203		278	86.9	24		18		42	13.2
Total (883)									799	90.5					84	9.5

It would appear that the adult male class, 95.6 per cent, had a more positive occurrence of the femoral tubercle than the adult female, 90.9 per cent (Table 2). However, the difference is not statistically significant by a chi-square test. On the other hand, when adult sexes were segregated for the presence of a femur tubercle on the left side, the males exhibited a significantly higher percentage presence. Chi-square was significant at the 10 per cent level but not at the 5 per cent level. The right side did not show a statistical significance (Table 6)

Lechleitner (op. cit.) indicated that skull measurements were not reliable as an aging criteria and therefore this expression was not investigated. He also reported no instances of open sutures on his sample of ranch mink skulls. This study revealed three sutures that were apparant in ranch skulls, of which two are valuable for age determination. Since the nasal sutures were observed in approximately fifty per cent of the juvenile specimens and only one instance of all adults, it seems that the presence of this suture would confidently indicate a juvenile animal.

With the female mink remaining as the critical sex for aging, it appears that the jugal-squamosal suture of the zygomatic arch may offer a criteria. Approximately fifty per cent of the specimens having opposite femur values (absent, left; present, right) were

in the adult female class. In the juvenile female class, approximately thirty per cent did not have paired suture values which constituted over fifty per cent of the total specimens not having paired values (Fig. 11, Table 5). From the above, it is deemed most important that consideration is given to both sides of these criteria for an accurate age classification.

FIGURE 11

ABSENT AND PRESENT CLASSIFICATION OF THE JUGAL-SQUAMOSAL SUTURE

RIGHT JUGAL-SQUAMOSAL SUTURE

LEFT JUGAL-SQUAM. SUTURE

		Absent		Present	
ADULT	Absent	(10 <u>12</u> . <u>22</u>	Ab Ab <u>289</u> . <u>352</u>	(9 <u>30</u> . <u>39</u>	(3) <u>13</u> . <u>16</u>
	JUVENILE				
	Present	(7 <u>13</u> . <u>20</u>	Pr Ab <u>7</u> . <u>8</u>	(204 <u>210</u> . <u>414</u>	(3) <u>9</u> . <u>12</u>

SAMPLE:

Juvenile Male - (230
Juvenile Female - 265
All Juvenile - .495

Adult Male - (68)
Adult Female - 320
All Adult - 388

The data (Table 6) would indicate the absence of the jugal-squamosal suture in adult females is more valid than the presence of a femur tubercle, 95.0 and 87.5 per cent respectively. Testing with the standard normal curve (Ostle, 1954), this criteria is significant at the one per cent level for the left side, whereas the right side is significant at the five per cent level.

Among juveniles, the suture was observed present slightly more often on the right side than on the left, whereas the left side of adults was inclined to be absent more frequently than on the right side. Testing each age and sex class, the juvenile female group was the only one to show a significant difference for the presence of a suture between the left or right side. At the five per cent level, the right side was more certain to have the suture than the left side.

Age classes and groupings (Table 2) were analyzed for variations between absence or presence of a tubercle on femur and jugal-squamosal suture, respectively. Testing with the standard normal curve, the $2\frac{1}{2}$ year and older grouping is the only one to show significance and this was influenced by the female class only.

TABLE 5

PAIRED AND UNPAIRED VALUES FOR THE JUGAL-SQUAMOSAL SUTURE

	<u>PAIRED</u>					<u>UNPAIRED</u>				
	<u>ABSENT</u>	<u>PRESENT</u>			Total	%	Pr Ab	Ab Pr	Total	%
	Ab Ab	Fa Fa	Dist Dist							
Juvenile Male (230)	10	118	58	186	80.9	16	28	44	19.1	
Juvenile Female (265)	12	124	48	184	69.4	22	59	81	30.6	
Adult Male (68)	61	3	--	64	94.1	1	3	4	5.9	
Adult Female (320)	291	8	--	299	93.4	7	14	21	6.6	
Total (883)				733	83.0			150	16.9	

TABLE 6

STATUS OF FEMUR TUBERCLE AND ZYGOMATIC SUTURE ON RANCH MINKS

	<u>Femur Tubercle</u> <u>ABSENT</u>		<u>Zygomatic Suture</u> <u>PRESENT</u>	
	LEFT	RIGHT	LEFT	RIGHT
$\frac{1}{2}$ yr. Male (230)	220 (95.7)	217 (94.3)	211 (91.7)	213 (92.5)
$\frac{1}{2}$ yr. Female (265)	249 (93.9)	249 (93.9)	223 (84.2)	240 (90.6)
	<u>PRESENT</u>		<u>ABSENT</u>	
$1\frac{1}{2}$ yr. Male (47)	44 (93.6)	44 (93.6)	43 (91.4)	41 (87.2)
$1\frac{1}{2}$ yr. Female (208)	180 (86.5)	178 (85.6)	192 (92.3)	187 (89.9)
All adult Males (68)	65 (95.5)	64 (94.1)	64 (94.1)	62 (91.2)
All Adult Females (320)	280 (87.5)	279 (87.1)	304 (95.0)	298 (93.1)

A statistical hypothesis that the presence of a tubercle on the femur is independent to the absence of a jugal-squamosal suture is rejected at the five per cent level. With this same test, all other groupings did not show an association between the two features.

CONCLUSIONS:

The features investigated on known age ranch minks did not provide age class distinction other than juveniles and adults.

Separation of age classes by baculum conformation only, is an accurate and convenient criterion which does not necessitate further skeletal preparation and examination. Development of the ischium edge of male pelvic girdles allows a feature for separating age classes which is as accurate as the baculum. Additional analysis of this feature may possibly permit advanced classification of the adult class. This criterion was not evident on the females.

For paired observations, the left side generally showed a slight predominance over the right side but was not of statistical significance.

In the juvenile female class, presence of the zygomatic suture was of greater occurrence than absence of the femoral tubercle. The yearling female class showed that a combination of both criteria increased their individual incidence. The $2\frac{1}{2}$ year and older female class, had a greater occurrence for the absence of a zygomatic suture. In the complete adult female class, the combination of both features is necessary to obtain a greater probability of correct classification of adult females.

From the known age collection, 99.5 per cent of the juvenile males were correctly classified by baculum conformation. By combining two criteria, femur tubercle present and jugal-squamosal suture absent, 97.2 per cent of all adult females were correctly classified.

A four-way combination table of these two features, including lost category, provides twenty probabilities of occurrence and is derived into a triple choice category key for easier classification.

At times, additional criteria affording aid in classification of juvenile specimens were: sandy or porous appearance along sagittal crest area, evident nasal sutures, and discernible epiphyses. An adult frequently appeared with an increased height, thickness, and arc of the jugal-squamosal area of the zygomatic arch, smooth and glossy sagittal crest area and absence of nasal sutures.

RECOMMENDATIONS:

Variations and extremes are inevitable among samples of wild mink

populations which have developed, competed and existed on a self sustaining basis as compared to ranch raised animals. It is recommended that aging criteria determined from the collection of known-age ranch mink be applied to wild harvest samples to determine the validity and adequacy of these features for management purposes.

It is further recommended that efforts be continued to obtain a means for determining year-age classes. If seasonal annuli from tooth sections could be interpreted and established for the mink, the method would be very desirable. If substantiated, it would provide an expeditious and economical technique for preparation and analysis of large samples. Analysis of variations in ossification of the pubic symphysis may provide an interpretation of refined age classification.

SUMMARY:

Before determining the age and sex ratio from samples of the wild mink harvest, it is necessary to qualify aging criteria for the female of the species.

The collection of 883 known age mink specimens (298 males, 585 females) was collected from Montana mink ranchers during the 1953 and 1954 pelting seasons.

A dermestid colony was used for cleaning all major bones retained from each specimen. Criteria determined from the males (used as a control) was verified by baculum conformation before application to the female. Several bone boards were made to establish a reference for the relative criteria existing among and between age classes. Findings from individual specimens were recorded on marginal punch cards.

The bones useful for distinguishing a juvenile from an adult were: baculum, femur, skull and pelvic girdle.

By baculum conformation only, 99.5 per cent of the juvenile male sample (230) was correctly classified juveniles and all adult specimens were readily declared adults.

Interpretation of absent, small, medium and large was used to classify the supra-sesamoid tubercle of each femur. Categories of absent (absent and small) and present (medium and large) was apparent. With this criteria, it was found that 92.8 per cent of the total specimens are within their respective category of juvenile and adult.

Three sutures were evident in the known age skull.

The nasal-premaxillary, maxillary, frontal suture were discernable in 61.3 per cent juvenile males, 41.1 per cent juvenile females and one specimen of 388 adults.

A mastoid-exoccipital suture was conspicuous in all age groups and of no value as an aging criterion.

The jugal-zygomatic process of squamosal suture appears valid for separation of juveniles (present) and adults (absent); 93.4 per cent are within their respective categories.

The sagittal crest had no value as an aging criterion. An undeveloped crest was usually found on the juvenile female but this feature also existed in the adult classes.

Definable annuli are present in canine sections but the limited sample did not permit a ready interpretation.

The elements of an innominate bone was obliterated. Variations existed in the internal and external pubic symphysis. The ischium edge of the pelvic girdle offered a distinction between the juvenile and adult male.

By combining both features, absence or presence of tubercle on femur and jugal-squamosal suture, the incidence for correct identification of 883 juveniles and adults was 843 or 95.5 per cent.

These criteria (femur tubercle, present; jugal-squamosal suture, absent) permitted 97.2 per cent of 320 adult females to be properly designated while the independent use of femur and suture show their respective frequency to be the same, 90.9 per cent.

A three choice category is derived from the twenty probable combinations of the two features.

Data indicates the importance for analyzing paired values of criteria for accurate age classification.

LITERATURE CITED:

- Elder, William H. 1951. The baculum as an age criterion in mink. Jour. Mamm., 32:43-50.
- Fisher, H. D. and B. A. Mackenzie. 1954. Rapid preparation of tooth sections for age determinations. Jour. Wildl. Mgt., 18:535-537.
- Lechleitner, R. R. 1954. Age criteria in mink, Mustela vison. Jour. Mamm., 35:496-503.
- Newby, F. E. 1955. Analysis of the 1953-54 fur take. Mont. Fish and Game Dept. Wildl. Rest. Div. Quar. Rpt., 4:1-24.
- Ostle, Bernard. 1954. Statistics in research. Iowa State College Press., 487 pp.

Petrides, George A. 1950. The determination of sex and age ratios in fur animals. Amer. Mid. Nat., 43:355-382.

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Wildlife Restoration Division

STATE	Montana		
PROJECT NO.	W-49-R-4		
DATE	July 15, 1955		
VOL.	VI	NO.	2

Title of Project: Fur Resources Survey and Investigation

Leader: Fletcher E. Newby

Job Completion Report

Job No. II-H

Investigations Project

Title of Job: Pilot Study of Marten Transplanting

OBJECTIVES:

- (1) To develop satisfactory holding and transporting techniques.
- (2) To transplant a limited number of marten into a depleted area for pilot studies to determine the success of such operations.

TECHNIQUES USED:

Methods of live-trapping, handling and tagging follow those described by Newby and Hawley (1954).

The combination holding and transporting cage developed in this study is pictured in Figures 1 and 2. The "run" or pen is a modified National Live Trap Company "cat carrier." Dimensions of the pen are 9 inches wide x 10 inches high x 16 inches long. Construction is of 14 gauge galvanized and painted one inch welded wire mesh. The metal bottom tray may be removed for cleaning or eliminated entirely. Conversion of the "cat carrier" consists of cutting holes for the entrance to the nest box and for the water cup. Placement of the handle is changed to correct balance after addition of the nest box. In the standard model of the "cat carrier" the metal bottom tray is spot-welded to the mesh, so order specifications for "runs" must call for a removable tray.

A galvanized sheet metal nest box was designed by the writer to attach to the converted "cat carrier." Dimensions are nine inches wide x eight inches high x eight inches deep. It consists of a simple box with a sliding top lid which gives access to the interior for examination of the marten or cleaning of the box. A screen of one inch mesh under the lid prevents escape of the marten while the lid is drawn back. The nest box is attached to the pen by means of four one inch long metal hooks soldered to the nest box. These hooks are spaced to slip over wires of the pen. A three inch circular entrance to the nest box can be closed by a sliding cover which runs in guides spot-welded to the nest box. A similar set of guides is welded to the top lid for safe storage of the sliding cover while the marten are in

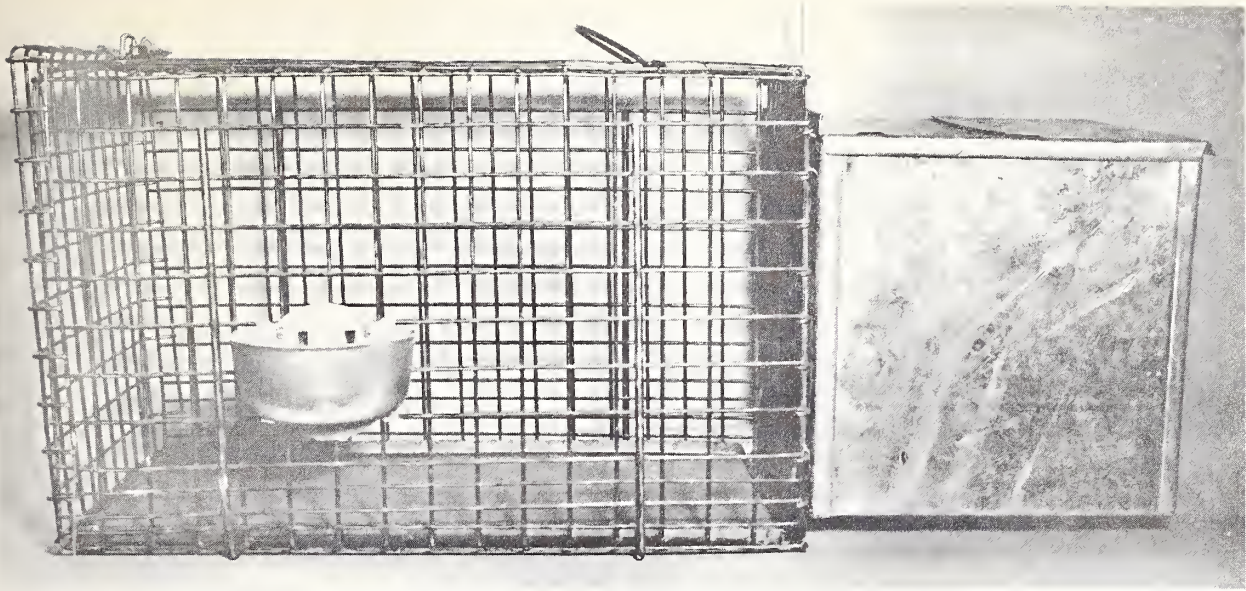


FIGURE 1 - Combination holding and transporting cage.

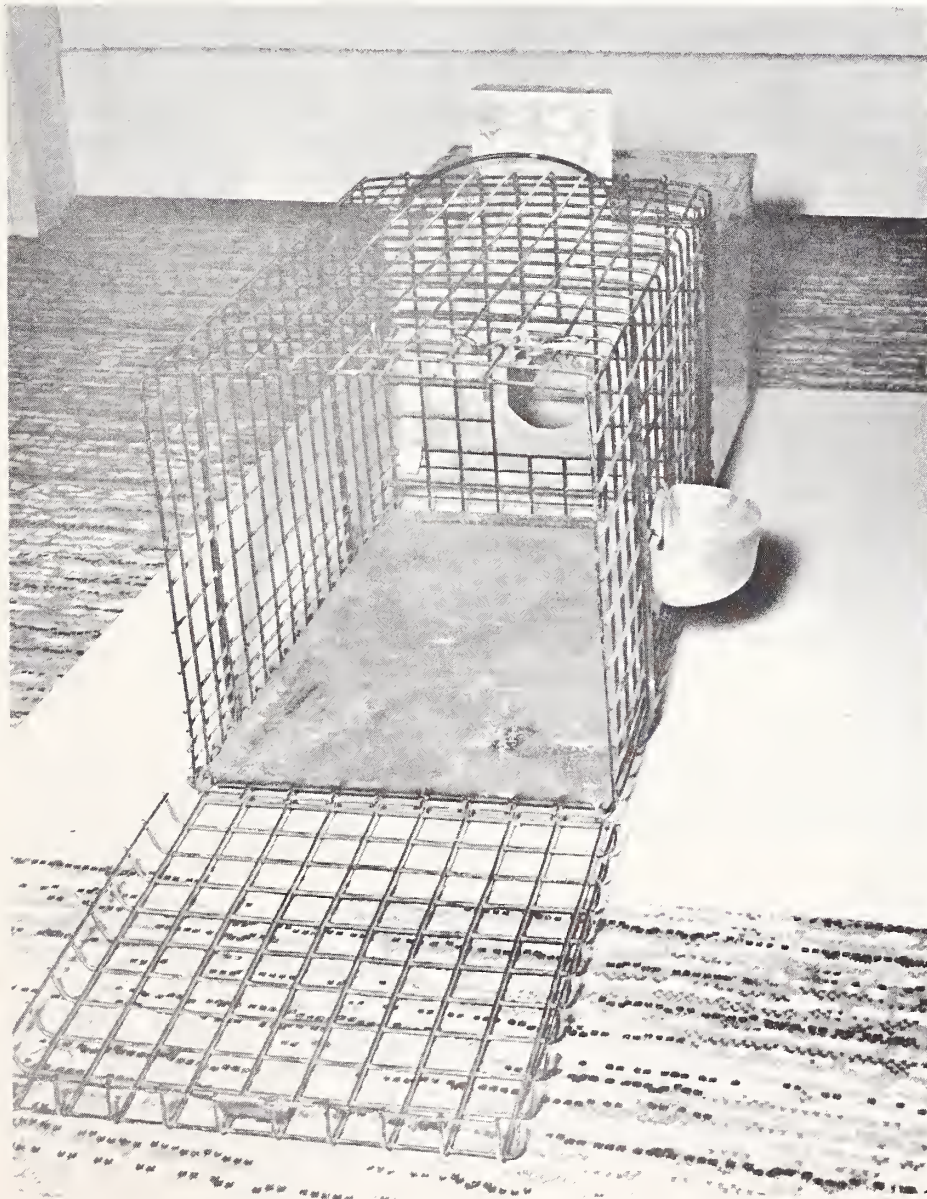


FIGURE 2 - Combination holding and transporting cage.

transit and for reinforcement of the top lid. Using this sliding entrance cover, the marten can be confined to the "run" for cleaning of the nest or to the nest for placing of feed in the "run."

Seven ounce Hay Manufacturing Company furring pen water cups attach tightly to the pen and largely prevent fouling or spilling of the water. Water cups were filled morning and evening for marten consume considerable quantities of water.

Marten were fed canned horsemeat while held in the cages. Two feedings per day, morning and evening, appeared to be adequate. Consumption of food by different individuals varies somewhat, but an effort was made not to give the marten more meat than they would readily consume. Excess food is frequently carried into the nest box and fouling of the nest results.

It was noted that marten became quite reluctant to leave the nest box when humans were in the vicinity. The animal usually could be expelled from the box by partially withdrawing the top lid and blowing on the animal or urging it with a stick. Because of this reluctance to leave the nest while disturbed, it is recommended that all examination, weighing and tagging be accomplished before placing the animal in the holding cage.

Examination of the release site after planting of the marten was limited solely to searching for tracks. Although live trapping of the area was planned, available time did not permit use of this technique.

FINDINGS:

Five male and two female marten were live-trapped during the period October 14 to 17, 1954 in the Shorty Creek and upper Whale Creek drainages of the Whitefish Range in Flathead County. These animals were held in the cages described, two being held for five days. The marten were transported to the head of Griffin Creek in Flathead County and released.

One additional juvenile male marten live-trapped with the seven transplants was not moved with the others but was held for 15 days before being released. All animals appeared to be in satisfactory condition when released.

Brief field inspections of the release site for tracks were made twice during the winter. One set of marten tracks was observed on January 24, 1955 during a very brief examination of the area on snowshoes. On April 12, 1955, the area was examined more extensively by the writer and James Ashley, Assistant Regional Supervisor, Federal Aid, using a motor toboggan. Although snow conditions were excellent for tracking and many tracks of snowshoe hare, squirrel, coyote and fox were seen, no marten sign was observed.

It is planned that at least three additional female marten will be released in this area in 1955. It will likely be some time before the success of this plant is satisfactorily determined.

REVIEW OF PREVIOUS MARTEN TRANSPLANTING EFFORTS:

Montana, 1944 (Thompson, 1949): Twelve marten, four males and eight females, were transplanted from the Whitefish Range to the Mount Fleecer area in November, 1944. Marten were later seen in this area, possibly indicating that the plant became established. Although statewide marten trapping seasons were held in 1950 and 1951, no marten were trapped in this area.

Idaho, 1948 (Rich, 1948): Eleven marten were transplanted from the head of the Lochsa River to Boulder Creek and Little Muddy Creek in Adams County in September, 1948. Three marten were moved from the head of Buffalo River in Fremont County to the head of Mill Creek in Bonneville County in 1948. Success of plants not known.

Ontario, 1950 (de Vos, 1952): Eleven males and seven females transplanted. Tracking studies indicated that at least several survived to the winter of 1951-52. In 1951 twenty males and nine females were moved.

Ontario, 1948-1950 (de Vos and Guenther, 1952): Recapture of tagged marten give possible indications that marten transplanted relatively short distances may attempt to return to original site of capture.

Ontario, 1953 (Reynolds, 1953): Seventy-five marten transplanted. No discussion of success.

Wisconsin, 1953-54: Five marten, two males and three females, were live-trapped from the Whitefish Range in Flathead County, Montana, in November, 1953, by personnel of the Fur Resources Section. These marten were shipped to Wisconsin for release on Stockton Island, one of the Apostle Island group in Lake Superior. Post-planting observations are summarized as follows for the period November 19, 1953 (release date) to March 16, 1954. (Jordahl, 1954).

December 1, 1953: Deer hunters on Stockton Island observed three marten.

March 3, 1954: Field check by Wisconsin Conservation Department personnel -- no marten sign observed.

March 15, 1954: University of Minnesota and Wisconsin Conservation Department personnel made a complete search of the island with seven observers. Results: "It appears that at least four and possibly all five of the marten have survived on Stockton Island. Track observations indicate that

marten have familiarized themselves and are using the greater portion of the island."

September 13, 1954 to November 20, 1954 (Dahlberg, 1954).

September 13 to 18, 1954: Three hundred fifty nine live-trap nights were set for marten. One untagged marten judged to be a juvenile was captured.

November 20, 1954: A member of the release party on November 19, 1953, reported seeing two marten near the release site on November 20, 1954, while hunting deer.

DISCUSSION:

Intensive live-trapping of marten (Newby and Hawley, 1954) has indicated that males engage in considerably more movement than females. This differential activity usually results in captures of more males than females. Since sex ratios of resident animals appear to be near one to one, it seems most desirable to approximate this ratio in the composition of transplant groups. This will commonly mean that a number of excess males will be trapped and released before the desired number of females is obtained.

Marten breed in July and early August; therefore, it would be most desirable to delay transplanting operations until after the adult females have been bred. This would insure production of young in the release area. Furthermore, by the middle of August, juveniles appear to be largely independent of the mother and no harm would result from separation of the young and adult female.

Plotting of the annual weight curve (Newby and Hawley, 1954) indicates that the highest weight of the year is attained in September. Breeding season activity is over at this time, small mammal populations are at their annual peak and the first heavy snowfalls have not yet arrived. Hibernation of several prey species, decrease in activity of insects and freezing of berries in October apparently result in marked weight losses.

In view of the foregoing observations, it appears that the optimum period for the establishment of marten transplants would be between the middle of August and the first of November.

RECOMMENDATIONS:

The holding and transporting cage developed in this study appears to be satisfactory for practical use in more extensive transplanting operations. It is recommended that arrangements be made for construction of approximately 24 such units.

Follow-up studies to determine the success of the pilot plant and subsequent plants are recommended as time permits. Although the success of the pilot plant is not determined, the ability of the

marten to adjust to new habitat is clearly indicated by the Wisconsin plant. As a result, it is recommended that more extensive transplanting activities be undertaken.

It is recommended that the sex ratio of transplant groups be held to approximately one to one.

Every effort should be made to restrict transplanting efforts to the period August 15 to November 1.

It is recommended that marten held for transplanting be fed and watered twice daily, morning and evening.

Although an optimum number for transplant groups has not been established, it is felt that not fewer than six nor more than twelve marten should be included in one plant in order to facilitate handling. It is further recommended that marten not be held longer than one week.

SUMMARY: A holding and transporting cage which consists of a wire mesh "run" or pen and sheet metal nest box was developed. A commercial mink watering cup is used.

Marten were held as long as 15 days in this cage and appeared to be in satisfactory condition upon release.

Success of the pilot plant was not conclusively determined although tracks were seen near the release site three months later. Live trapping of the area is planned.

Review of previous marten transplanting efforts indicates that marten are able to adjust to new habitat.

Recommendations are made to guide more extensive transplanting operations.

LITERATURE CITED:

Dahlberg, B. L. 1954. Personal correspondence.

de Vos, A. 1952. Ecology and management of fisher and marten in Ontario. Ontario Dept. of Lands and Forests, Technical Bulletin.

de Vos, A. and S. E. Guenther. 1952. Preliminary live trapping studies of the marten. Jour. of Wildlife Mgt. 16(2): 207-214.

Jordahl, H. C. 1954. Personal correspondence.

Newby, F. E. and V. D. Hawley. 1954. Progress on a marten live-trapping study. Trans. 19th N. Amer. Wildlife Conf. 19: 452-460.

Reynolds, K. F. 1953. Personal correspondence.

Rich, V. B. 1948. Statewide trapping and transplanting project.
Pittman-Robertson Quarterly Report, July - October.
Idaho Fish and Game Department.

Thompson, W. K. 1949. A study of marten in Montana. Proc. 29th
Ann. Conf. Western Assoc, of State Game and Fish Commis-
sioners.

Submitted by:

Name Fletcher E. Newby

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Wynn G. Freeman, Ass't Coordinator

Wildlife Restoration Division

CORRECTION

Vol. VI, No. 1
January-April, 1955

The second paragraph on page 84 of the W-59-R-2 report "Eastern Montana Deer Population Studies - Checking Station Analysis" should read as follows:

"Comparison of B:D ratios for the areas in general, indicate the harvest of bucks exceeds that of does. From a management standpoint this is satisfactory since any area having a 1:1 sex ratio is supporting surplus bucks. This year in the Ashland district more bucks were harvested than does. This may reflect a surplus of bucks or a high degree of hunter selectivity or both. Field observations have not indicated a lopsided sex ratio, leaving the selectivity of hunters as the probable cause. Ascertaining buck:doe ratios from checking station data under any circumstances is at best hazardous."

STATE	Montana
PROJECT NO.	W-59-R-2
DATE	July 15, 1955
VOL.	VI NO. 2

FINAL REPORT

For

INVESTIGATION PROJECTS

As Required By

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: Eastern Montana Big Game Surveys
2. Personnel: Don L. Brown
Robert L. Eng
Joe Egan
Jack Saunders
Glen Cole
Student Assistants
3. Completion Report:

Work Plan I: Population Studies of Big Game Species in Eastern Montana

I-A: Antelope

1. Central Montana - Completion report attached and others reported previously.
2. Southeastern Montana - Completion reports attached.
3. Northeastern Montana - Inactive during report period.
(This work was completed for the year before W-59-R-2 went into effect)

I-D: Deer

1. Central Montana - Completion Report attached.
2. Southeastern Montana - Completion Reports attached.
3. Northeastern Montana - Reported April Quarterly (1955)

I-E: Elk

1. Central Montana - Completion Reports attached.

I-G: Goats

1. Central Montana - Completion Reports attached.

I-S: Sheep

1. Central Montana - Reported April Quarterly (1955)

Work Plan II - Investigations and Surveys of Big Game Ranges in Eastern Montana

II-A: Antelope

1. Central Montana - Information included under write ups for Work Plan I.
2. Southeastern Montana - Completion Report attached.
3. Northeastern Montana - Inactive during report period.

II-D: Deer

1. Central Montana - Information included under write ups for Work Plan I.
2. Northeastern Montana - Information included under write ups for Work Plan I.
3. Southeastern Montana - Completion Report attached.

II-E: Elk

1. Central - Information included in write ups for Work Plan I

II-G: Goats

1. Central - Information included under write ups for Work Plan I.

II-S: Sheep

1. Central and Southeastern - Information reported in April Quarterly (1955). Completion report attached.

Work Plan III

III-A: Relationship of Antelope to Agriculture and Rangeland Use - Abstract of paper to be published:

In an attempt to acquire data to accurately compute the annual increase of Eastern Montana antelope, four areas of 100 square miles were completely censused by air. Validity of present census methods were also tested. Results of the survey were incomplete because of the small sample both in area and number of plots.

Antelope and Winter Wheat - Rangeland phase:

This portion of the work plan was not done under this project but is set up for 1955-1956.

III-D: Food Habits and Range Use of the Mule Deer on the Judith
Game Range and Immediate Vicinity - Final Report attached.

Submitted by:

Name Don L. Brown

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-59-R-2
DATE	July 15, 1955
VOL.	VI NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Completion Report

Investigations Project

Work Plan I

Job No. I-A

Title of Work Plan: Population Studies of Big Game Species in Eastern Montana

Title of Job: Antelope (Central)

AERIAL ANTELOPE SURVEY YELLOWSTONE UNIT SOUTHERN
WHEATLAND SUB-UNIT

DATES: July and August, 1954

PERSONNEL:

Don L. Brown, Senior Biologist (Pilot)
Jack K. Saunders, Junior Biologist
Gene W. Tierney, State Game Warden
Several resident ranchers

OBJECTIVES AND PROCEDURE:

This survey is designed to produce information relative to population dynamics of antelope as well as year to year management data.

This is the seventh year of aerial work accomplished in the Wheatland sub-unit of the Yellowstone Management Unit. It was intended that this area, censused on an annual basis, would furnish yearly information which might be lacking in the overall biennial census of the entire Yellowstone Unit.

FINDINGS:

Table I lists antelope populations found within flight unit boundaries for 1954.

Table II is a summary of population data for the entire sub-unit for the six year period.

TABLE I

ANTELOPE POPULATION BY FLIGHT UNITS FOR 1954
CENSUS SUMMARY

Flight-Unit	Unclassified	Male	Female	Fawn	Total	Sq. Miles	Ant. Per Sq. Mile
XIII	105	27	93	85	310	87	3.56
XIV	----	2	30	25	57	22	2.59
XV	8	48	116	109	281	50	5.62
XVI	36	2	40	46	124	22	5.64
XVII	154	98	273	264	789	107	7.37
XIX	138	44	178	187	547	80	6.84
XX	89	17	21	28	155	22	7.04
XXI	699	158	65	123	1045	127	8.23
XXII	91	68	65	65	289	66	4.38
TOTAL	1320	464	881	932	3597	583	6.17

TABLE II

SEVEN - YEAR ANTELOPE POPULATION SUMMARY OF WHEATLAND SUB-UNIT

Census Year	Total Antelope	Percent Classified	Sex and Age Composition % Bucks % Does % Fawns	Computed Classification Bucks Does Fawns	Yearly Harvest	% Herd Harvested
1948	3165	None			748	23.6
1949	3820	40.0	32.3 33.5 34.2	1234 1280 1306	600	15.7
1950	4214	40.6	42.8 28.5 28.7	1804 1201 1207	924	21.9
1951	4499	53.2	30.2 36.3 33.5	1359 1633 1507	1250	27.8
1952	4678	63.5	40.2 29.6 30.2	1881 1385 1412	2106	45.0
1953	3584	71.5	27.1 37.4 35.8	971 1331 1383	1150*	32.1*
1954	3597	63.3	20.4 3817 40.9	734 1392 1371	1406	39.9

* Please note the error in Pittman-Robertson Quarterly Report, (Volume V, No. 2., 1954. p. 120), which is corrected in this issue.

Census Year	Percent Herd -- Fawns	Percent Herd -- Adults	Percent Annual Increase
1948	Not classified		
1949	34.23	65.9	52.07
1950	28.73	71.27	40.33
1951	33.51	66.49	50.42
1952	30.2	69.8	43.2
1953	35.8	64.2	55.7
1954	40.93	59.07	69.29

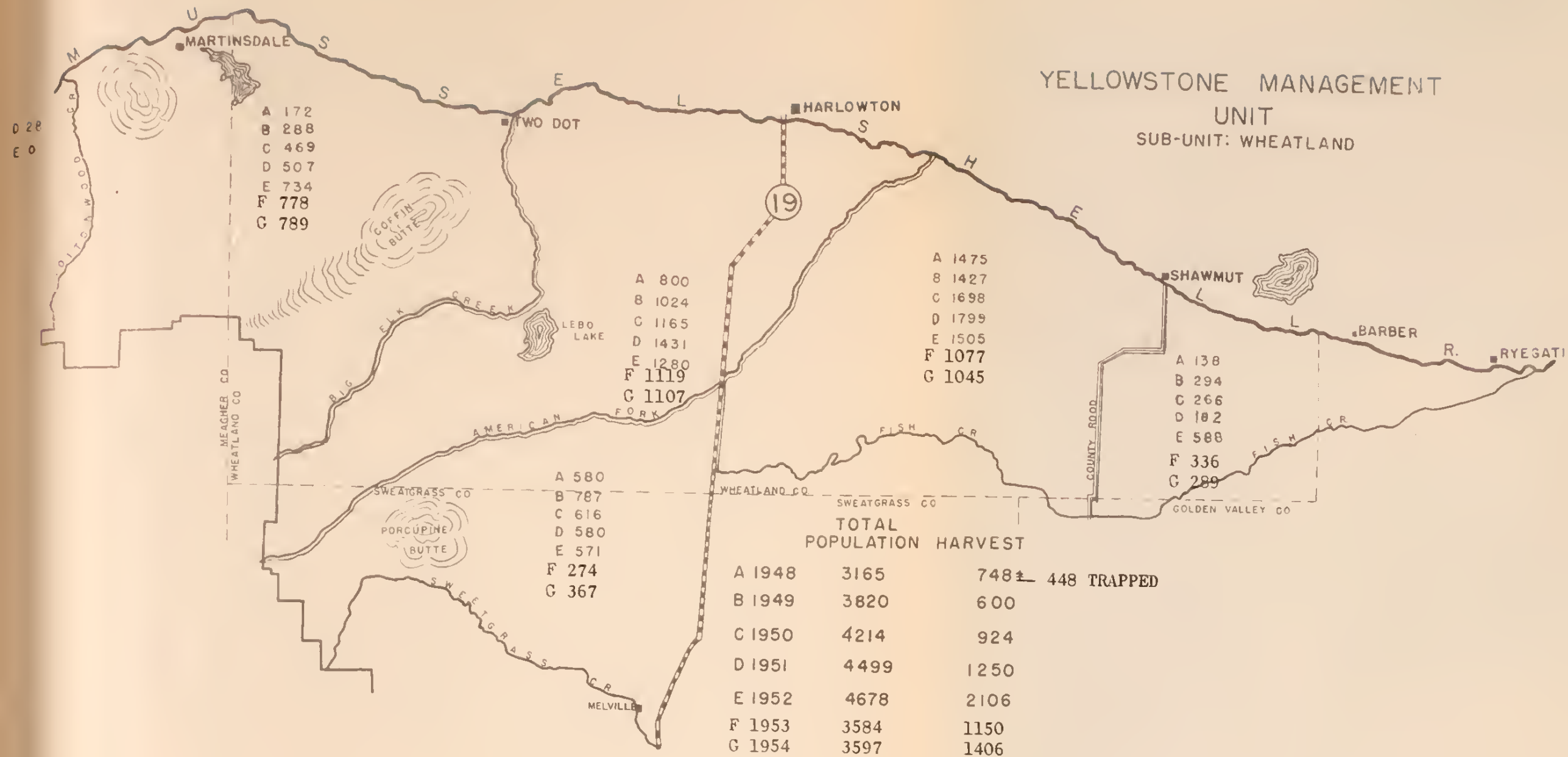


TABLE III
RESULTS OF TEN PER CENT RANDOM SAMPLE QUESTIONNAIRE

Hunting Area	No. Permits Issued	Per Cent Successful	Per Cent Males Harvested	Per Cent Females Harvested	Computed Kill
Area 15 West of Highway 19	704 (either sex)	88.9	50.00	50.00	626
Area 16 East of Highway 19	702 (either sex)	76.5	66.67	33.33	537

Figure I is a map which includes data comparing populations within topographic boundaries shown during the seven years of census.

Table III is an analysis of card return data, based upon a sample of 10% of the hunters who received antelope permits in these areas.

The yearly harvest as used in Table II represents all of the permits issued. This is not the actual harvest (Table III) but the annual loss closely approaches this figure due to crippling loss and natural mortality.

CONCLUSIONS AND RECOMMENDATIONS:

The data indicates an annual increase of 69.3 per cent. This is a high figure even for Central Montana antelope populations, and may be explained at least in part by these two factors. As a result of harvests directed at reducing the numbers of male antelope in the populations, their numbers have been reduced (from 40.2% of the herd in 1952 to about 20.3% at present.) This would cause a mathematical shift upward in the annual increase as well as a physical increase by allowing more females to be present making for a greater potential reproductive capacity for a given number of animals. Also another possibility is that of error due to the fact that a large part of the area was counted by inexperienced observers.

Due to the fact that no buck permits were issued in 1954, one could have expected a light kill of male antelope in a population such as this one, where the males are in a decided minority. However, the hunter card return analysis indicates that the kill of male antelope in 1954 was only 4.75% lower, based on the per cent of the kill each year being males (57.25% in 1953, and 52.50% in 1954). Assuming that this trend will continue, the annual increase may stay relatively high as it is now.

The hunter success on either sex permits decreased somewhat in 1954 from what it was in 1953. This may have been partially affected by the poor weather conditions during the beginning of the season.

Submitted by:

Name Jack K. Saunders

Title Junior Biologist

Approved by:

Name Don L. Brown

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-59-R-2
DATE	July 15, 1955
VOL.	VI NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Completion Report

Investigations Project

Work Plan I

Job No. I-A

Title of Work Plan: Population Studies of Big Game Species in Eastern Montana

Title of Job: Antelope (Southeastern)

AERIAL ANTELOPE CENSUS -- EASTERN MONTANA FAWN COUNT

ABSTRACT

In an attempt to acquire data to accurately compute the annual increase of Eastern Montana antelope, four areas of 100 square miles were completely censused by air. Validity of present census methods were also tested. Results of the survey were incomplete because of the small sample both in area and number of plots.

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Job Completion Report

Investigations Project

Work Plan I

Job No. I-A

Title of Work Plan: Population Studies of Big Game Species in Eastern Montana

Title of Job: Antelope (Southeastern)

AERIAL ANTELOPE CENSUS -- EASTERN MONTANA FAWN COUNT

PERSONNEL:

John B. Nicolay, Deputy Game Warden (Pilot)
Joe Egan, Junior Biologist (Observer)

DATES: August 3, 4, 5, 6, 1954

OBJECTIVES:

To ascertain the annual increase of antelope herds in southeastern Montana.

To acquire data to test partial count against total count methods of aerial antelope census.

PURPOSE:

Accumulation of data on reproduction and aerial census techniques that can be applied to the management of southeastern Montana antelope.

TECHNIQUES:

Four small areas of approximately 100 square miles were established in the various types of antelope habitat. These areas were not necessarily picked at random, since significant boundaries were essential to the success of the survey. Consequently, the area boundaries were located to conform to roads, creeks, etc.

These areas were covered by airplane, (Piper PA-18A, 135 hp.) using much the same methods as employed during the spring survey of April, May and June, 1954. (See P-R Quarterly, Vol. IV, No. 2, Page 5, 1953).

The only exception was the interval of the flight strips. During the spring survey the flight strips were six miles apart, whereas

during this survey they were one mile apart or less, depending on the topography. Also all antelope within the areas were counted. (Fawns were not counted during the spring survey.)

The time of this survey was determined by the completion of the fawning period plus additional time to allow all fawns to become old enough to travel freely with adults.

FINDINGS:

Table I lists the information taken from the four areas (See Figures 1 through 4) and Table II is the computed data.

A comparison of adult antelope only per square mile between the six-mile (spring count) and one-mile strip interval methods is shown in Table III. In this comparison the entire length of the two or three six-mile interval strips occurring in the vicinity of one of the four areas was used.

DISCUSSION AND CONCLUSIONS:

From the standpoint of acquiring data that could actually be used in determining herd production and the validity of the six-mile strip interval census method the survey was not successful. From the standpoint of determining herd distribution for this time of year, number and size of this type of selected areas needed and methods to be used in the survey, this investigation was quite successful.

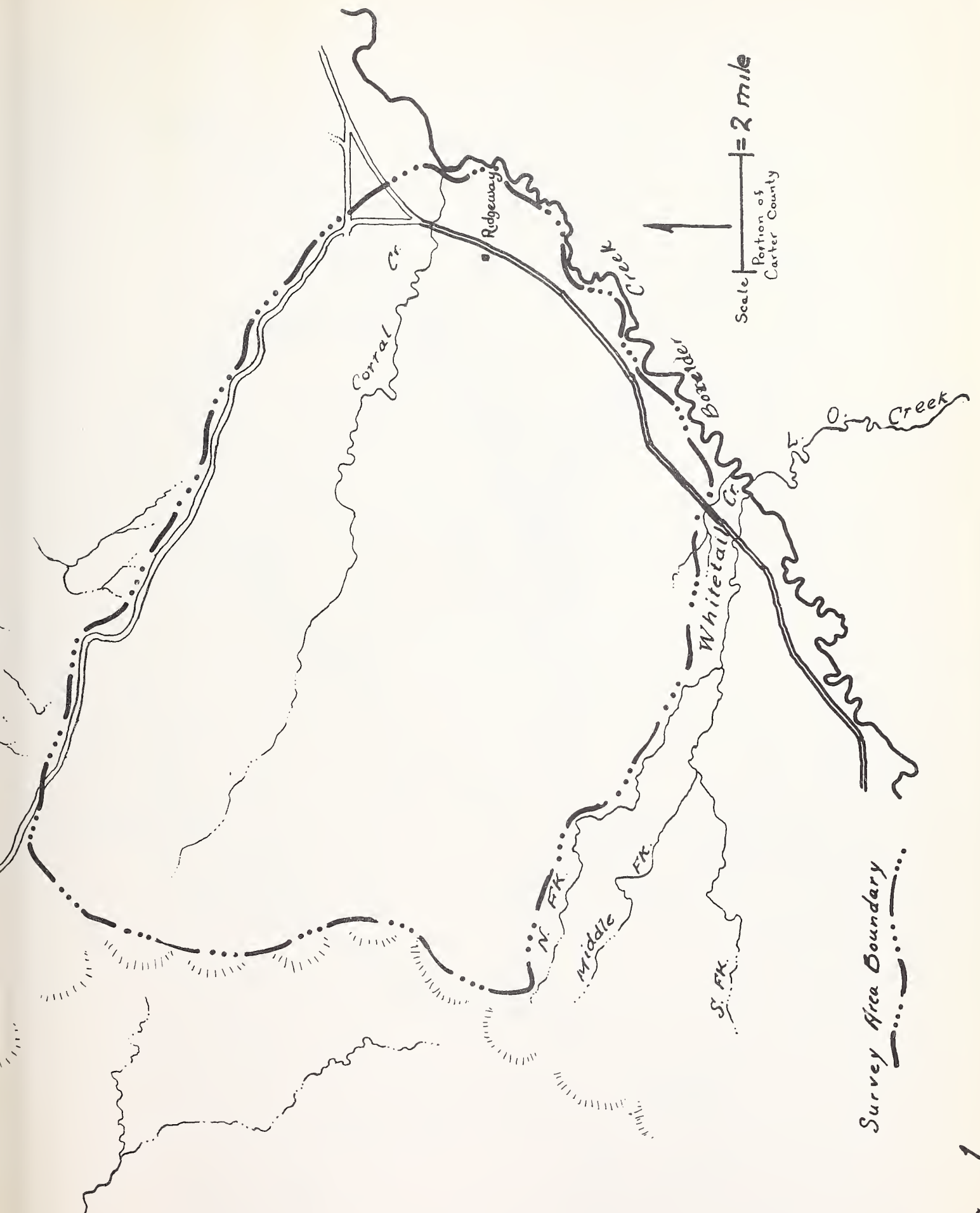
An area of 100 square miles is quite small to be applied to the total square miles involved and seasonal distribution of antelope at this time of year (between fawning and breeding times) makes it quite possible to miss buck herds. A larger area, either by way of more 100 square mile plots or plots of 250 square miles or more, is needed to adequately sample the population by this method.

In such a sampling method it is necessary to have enough areas to compensate the errors occurring in any one area.

The various ratios, annual increases and herd compositions for these four areas only is believed to be very near the actual. This is based on the fact that all four areas were small enough to be covered easily and quickly and did not offer enough places of concealment for many antelope to be overlooked. The annual increases are considered to be approximately the same for adjacent areas of like habitat.

RECOMMENDATIONS:

The areas of complete coverage (flight strips at one-mile intervals) should be increased and enlarged to at least 250 square miles in order to adequately test the census methods.



Survey Area Boundary

Fig. 1

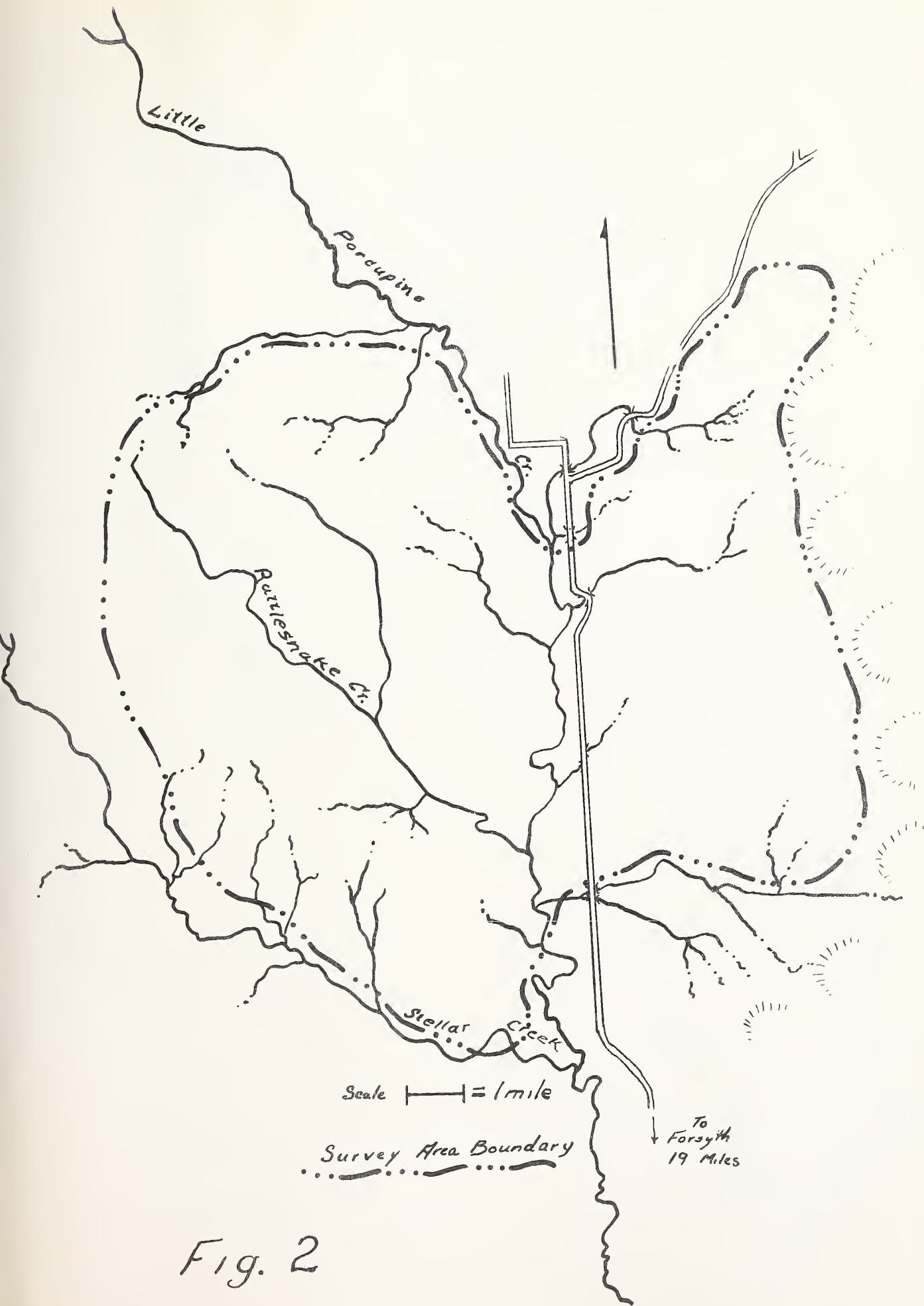
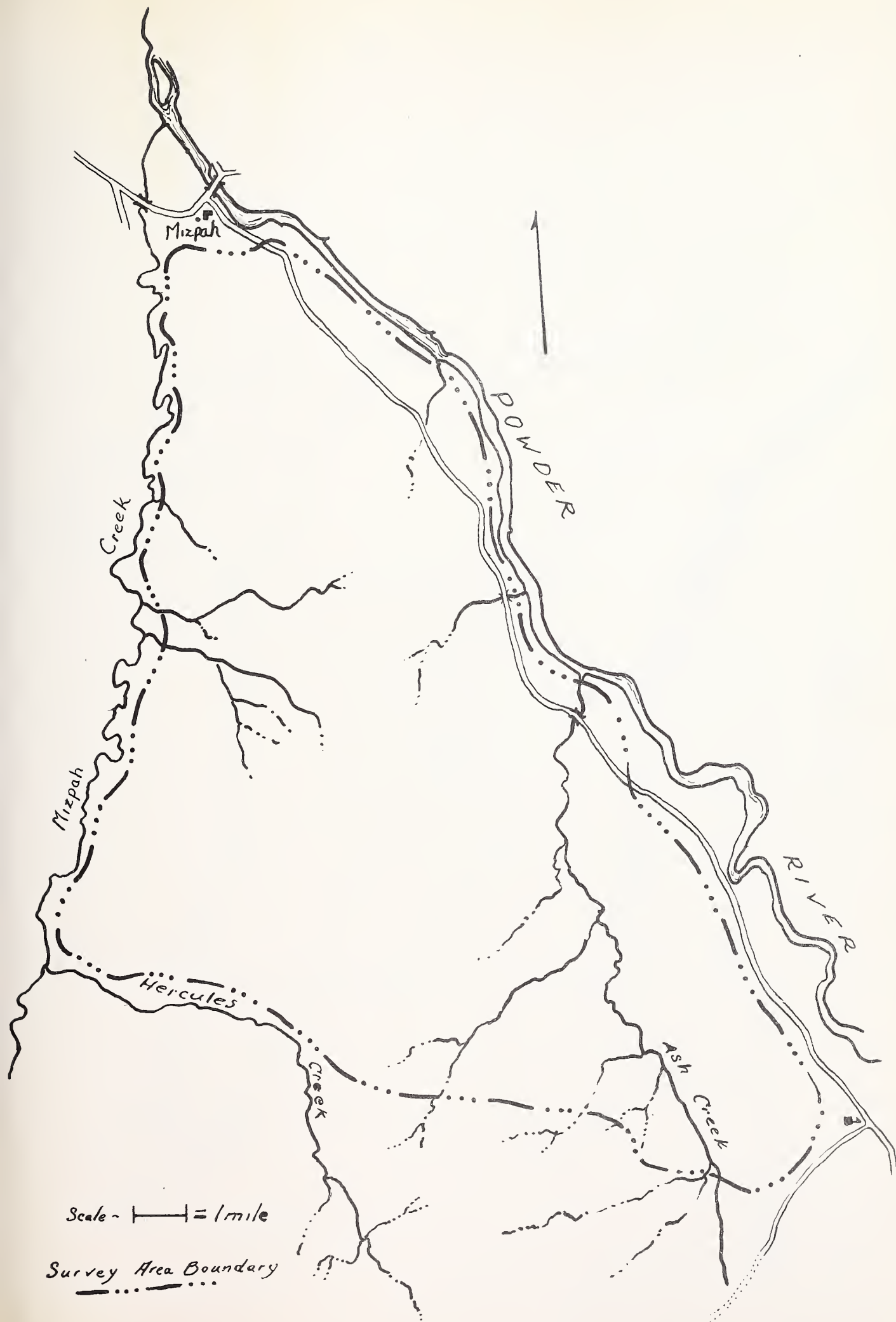
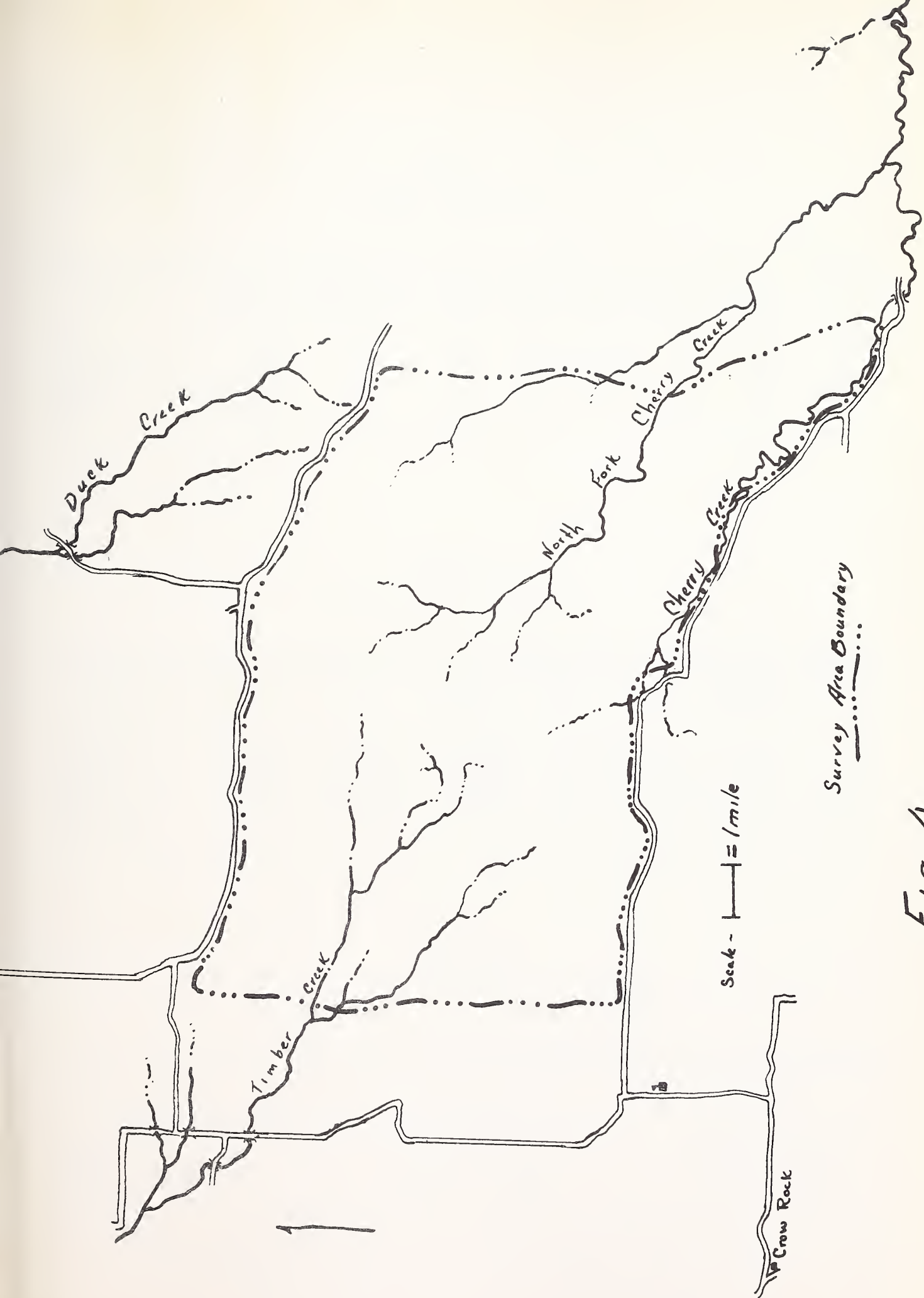


Fig. 2





Survey Area Boundary

Fig. 4

TABLE I
SAMPLE AREA DATA

Area	Sq. Mi.	Ant. / Sq. Mi.	Uncl	Bucks	Does	Fawns	Total	Flying Time
Ridgeway	103	3.5	48	109	96	101	354	1:40
L. Porcupine	109	1.5	23	29	53	59	164	1:20
Mizpah	100	3.7	38	46	139	147	370	2:25
Crow Rock	103	2.4	0	68	78	101	247	2:00

TABLE II
COMPUTED SAMPLE AREA DATA

Area	Bucks	Does	Fawns	B:D	D:F	Ad:Fawns	Ann. Inc.
Ridgeway	126(36%)	111(31%)	117(36%)	1:0.88	1:1.05	1:0.49	49%
L. Porcupine	34(20%)	62(38%)	68(42%)	1:1.82	1:1.09	1:0.71	71%
Mizpah	51(14%)	155(42%)	164(44%)	1:3.04	1:1.06	1:0.70	70%
Crow Rock	68(27%)	78(32%)	101(41%)	1:1.15	1:1.29	1:0.69	69%

TABLE III
COMPARISON OF STRIP INTERVAL METHODS

Area	Six Mile	One Mile
Ridgeway	3.78 / sq. mi.	2.30 / sq. mi.
Little Procupine	0.76 / sq. mi.	0.90 / sq. mi.
Mizpah	1.61 / sq. mi.	2.06 / sq. mi.
Crow Rock	1.19 / sq. mi.	1.41 / sq. mi.

It is further recommended that such a survey be conducted every year until sufficient data has been accumulated to apply to the management of these antelope populations.

Submitted by:

Name Joe Egan

Montana State Department of Fish and Game

Title Junior Biologist

By Faye M. Couey, Assistant Director

Wildlife Restoration Division

Date April 15, 1955

STATE Montana
PROJECT NO. W-59-R-2
DATE July 15, 1955
VOL. VI NO. 2

FINAL REPORT
For
INVESTIGATIONS PROJECTS
As Required By

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: Eastern Montana Big Game Surveys

2. Personnel: Don L. Brown
Robert L. Eng
Joe Egan
Jack Saunders
Glen Cole
Student Assistants

3. Completion Report:

Work Plan I: Population Studies of Big Game Species in Eastern Montana

I-A: Antelope

2. Southeastern Montana

The major portion of the work spent on this project was aerial census work done in May, June and August of 1954. These reports appear in the P-R Quarterlies Vol. V, No. 2, 1954, P. 112; Vol. V, No. 3, 1954, P. 25. A hunter card questionnaire analysis is being worked up at the present and the results of the 1954 harvest will be presented.

Because of the agricultural operations in Southeastern Montana, antelope numbers are necessarily controlled, to a large extent, by rancher tolerance. This is below the saturation level of antelope on their range.

Submitted by:

Name Joe Egan

Title Junior Biologist

Approved by:

Name Don L. Brown

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana		
PROJECT NO.	W-59-R-2		
DATE	July 15, 1955		
VOL.	VI	NO.	2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Completion Report

Investigations Project

Work Plan I

Job No. I-D

Title of Work Plan: Population Studies of Big Game Species in Eastern Montana

Title of Job: Deer (Southeastern)

ABSTRACT

During February, 1955 trapping and tagging of deer was carried on in the Long Pines of the Custer National Forest (Sioux Division).

Five white-tail deer were tagged: two adult males, one adult female, one fawn male and one fawn female.

The project was established for the purpose of acquiring management data for this area specifically and in general for similar areas throughout southeastern Montana.

A late start in trapping operations and inclement weather during the trapping period gave rather meager results.

Positive data was obtained relative to procedures and materials needed for proposed work in the fall and winter of 1955.

STATE	Montana
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Leader: Don L. Brown

Job Completion Report

Investigations Project

Work Plan I

Job No. I-D

Title of Work Plan: Population Studies of Big Game Species in Eastern Montana

Title of Job: Deer (Southeastern)

DATES: January and February, 1955

PERSONNEL:

Warren Linville, Deputy Game Warden
John B. Nicolay, Deputy Game Warden
Cecil Gilmore, Deputy Game Warden
William Maloit, Deputy Game Warden
Joe Egan, Junior Biologist

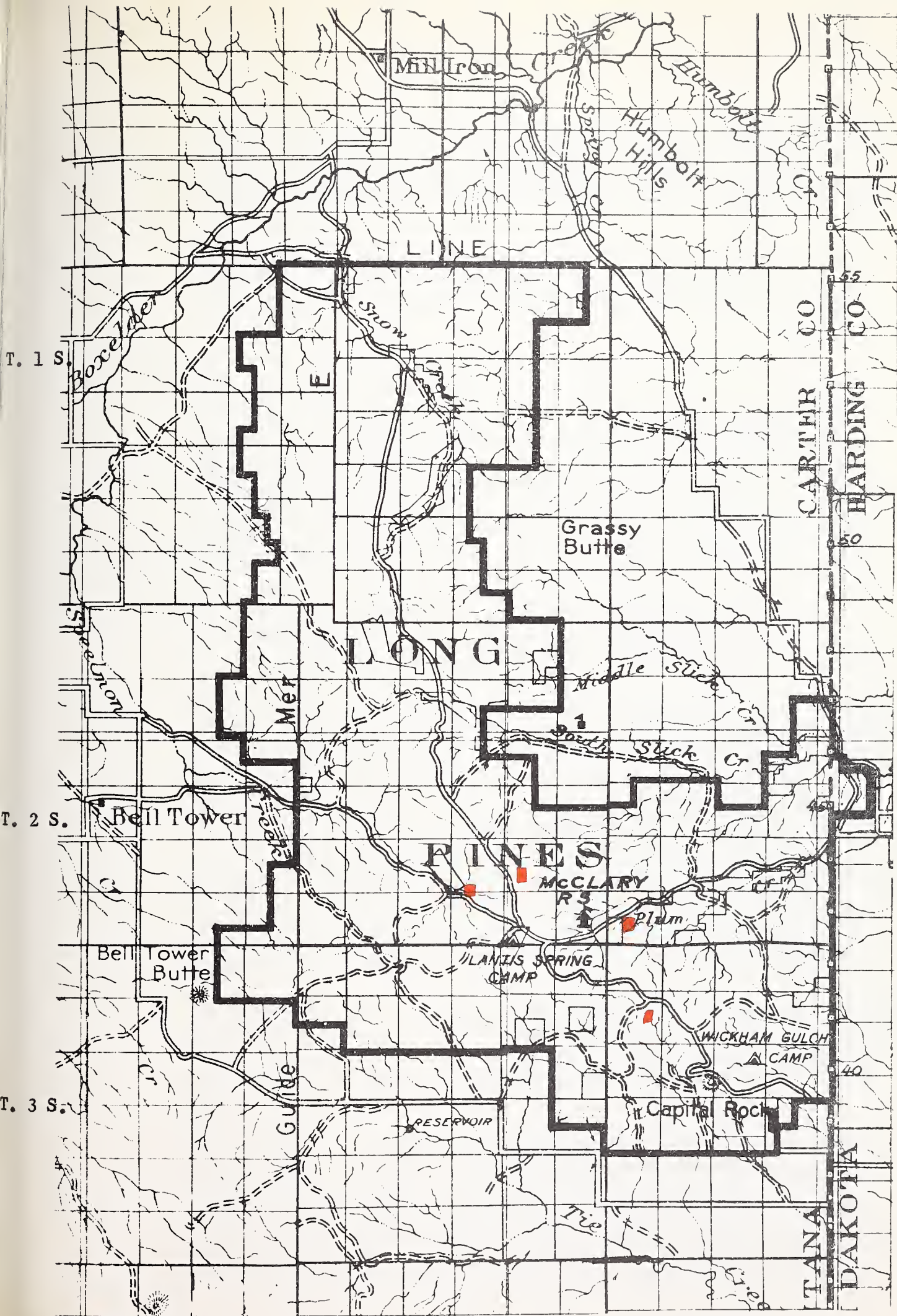
OBJECTIVES:

1. To determine population indicies of deer (both white-tail and mule deer) in that portion of the Custer National Forest (Sioux Division) known as Long Pine in northeast Carter County.
2. To ascertain the extent of a reported increase in white-tail and a decrease in mule deer in this area.
3. To acquire information as to age and sex composition of the two species, year-around movements, annual increases, and other biological information pertinent to these animals useful in their proper management.

PROCEDURE:

The techniques used were based on methods employed by other workers in marking wild animals. That is, the animals were trapped, marked and released.

The four traps used were of the box type, consisting of a screen portion and an enclosed portion. These traps and a



■ R. 60 E.
 Location of deer traps

catch crate were loaned by the South Dakota Game, Fish and Parks Department. Traps were baited with oat shocks. Plastic ear tags were used as markers. Traps were placed in selected areas in order that both the white-tail and mule deer could be captured and marked.

Trapping operations were stopped the latter part of February, because it was feared some losses were possible among does at this stage of pregnancy. Traps were checked every morning.

FINDINGS:

The four traps were set up during the latter part of January and the first part of February. The project was scheduled to start in late November but due to difficulty in securing the traps and inclement weather, operations were necessarily postponed until January. The four trap sites were baited a week before trapping operations. All four areas showed use by deer. All traps were baited and set on January 31. The location and designation of the four traps are as follows:

Blocker Field Trap	- R26E, T3S, SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 7
Upper Flat Trap	- R61E, T2S, NE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 26
West Entrance Trap	- R61E, T2S, SE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 27
McClary Trap	- R62E, T2S, NE $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 31

After all traps were baited and set for operation, deer activity around the Upper Flat and McClary traps ceased. Cause is ascribed to two factors. The Upper Flat trap was on the eastern edge of a mesa $\frac{1}{3}$ by $\frac{3}{4}$ miles in size; blizzard conditions were prevalent through most of February, exposing this trap to the full force of the storms. The McClary trap was less than a quarter of a mile from McClary Ranger Station where the trapping crew lived. Although trap and station were not in sight of one another, it probably had some effect on the deer activity around this trap. Because of weather conditions, it was not very practical to move the two traps to new locations. Thus, only two traps were effective during the operation -- the Blocker Field and West Entrance traps.

It might be well to mention that on January 27, eighteen Merriam's Turkeys were released in this area about 3 or 4 miles east of the Blocker Field trap. Consequently, late mornings and afternoons were spent acquiring information concerning the success of the plant.

On February 14, a fawn white-tail doe was caught in the Blocker Field trap. In spite of the fact this trap did not completely shut (leaving a 10 to 12 inch space under the door) the deer remained in the trap. The deer was handled by hand and marked with a yellow plastic marker in the right ear. This was fastened to the ear by a numbered metal ear tag and a second numbered metal ear tag was put in the left ear. This deer was in good

flesh and appeared very healthy. On February 15, an adult white-tail doe was captured in each of the two traps. However, because of inexperience on the use of the traps and catch crate, both deer escaped before tagging or examination could be accomplished.

On February 17, an adult white-tail doe was captured and marked at the Blocker Field trap.

On February 18, because of blizzard conditions, it was impossible to check the West Entrance trap. On February 19, a trail was broken to the West Entrance trap site. The trap contained an adult white-tail buck and a fawn white-tail buck. From all indications these animals had been in the trap since the night of the 17th. However, they were in good condition. The adult buck had previously shed his antlers. During the course of the turkey investigations several days later, two white-tail bucks were observed and neither had shed the antlers.

On February 20, an adult white-tail buck was captured in the Blocker Field trap. This deer's antlers had also been shed.

For the next week there was no activity in the area because of storm conditions. The project was finally discontinued on March 4. As soon as weather permits, the traps will be dismantled and returned.

This area as stated is principally mule deer habitat and although a few mule deer were observed in the area, none were captured.

Review of the animals captured:

Blocker Field,	Feb. 14:	Fawn female, white-tail, marked
West Entrance,	Feb. 15:	Adult female, white-tail, escaped
Blocker Field,	Feb. 15:	Adult female, white-tail, escaped
Blocker Field,	Feb. 17:	Adult female, white-tail, marked
West Entrance,	Feb. 19:	Fawn male, white-tail, marked
West Entrance,	Feb. 19:	Adult male, white-tail, marked
Blocker Field,	Feb. 20:	Adult male, white-tail, marked

DISCUSSIONS AND CONCLUSIONS:

Although this area is quite isolated and contains only 96 sections, five deer are, of course, an insufficient number for this type of study. Enough information was gained, however, on the number and placement of traps for the work scheduled the fall and winter of 1955. A minimum of ten traps is required and placement will necessarily have to include the northern portion of the area and onto the edges of the forest boundary if mule deer are to be captured and marked.

The Long Pines area is considered to be primarily mule deer habitat; however, only white-tail were captured. More white-tail deer were observed than mule deer. This perhaps is an indication that the white-tail are increasing and the mule deer are decreasing.

Correspondence from the United States Forest Service, District Ranger's Office, Camp Crook, South Dakota, dated December 9, 1952, states:

"The mule deer have been moving out of the Long Pines for the last several years.....

".....this District (Long Pines) in 1936, there were very few mule deer and no white-tail."

This correspondence gave population estimates for 1946 through 1952. In 1946, it lists 30 mule deer and 30 white-tail; in 1951, it lists 75 mule deer and 100 white-tail; in 1952, 100 mule deer, 120 white-tail. These figures are probably trend figures and indicative of the relative increase in deer numbers only.

Since the trapping period, many trips have been made into the area by Department and Forest Service personnel. None of the marked deer have been observed.

It is planned that on or about November 20, 1955, trapping operations will be resumed for the continuation of this study.

Submitted by:

Name Joe Egan

Title Junior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana	
PROJECT NO.	W-59-R-2	
DATE	July 15, 1955	
VOL.	VI	NO. 2

FINAL REPORT

For

INVESTIGATIONS PROJECTS

As Required By

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: Eastern Montana Big Game Surveys

2. Personnel: Don L. Brown
Robert L. Eng
Joe Egan
Jack Saunders
Glen Cole
Student Assistants

3. Completion Report:

Work Plan I: Population Studies of Big Game Species in Eastern Montana

I-D: Deer

2. Southeastern Montana

Carter Unit: The most extensive work done in this area was during February 1955 (see report). This area, although primarily mule deer habitat, has a white-tail deer population that is increasing to the point where a serious over-population condition could exist. Many browse species show definite signs of over-use by deer. Hunter harvests in the past have had very little effect in checking the condition. The area is National Forest (Custer National Forest-Sioux Divide-Long Pines) and hunting is more or less unrestricted. Mild winters for the past several years have eliminated the possibility of any great winter die-off.

Ashland District: Some work for this area is reported in the 1954 hunting season Checking Station Analysis. Pre- and post-hunting season observation and reports have indicated this area still supports a substantial mule

deer population. As in other areas rancher tolerance will probably be the deciding factor in the maximum numbers allowed. It is felt this number is well below an irruptive condition. White-tail deer are present in some measure in the area, but information to date does not disclose the extent of their numbers. In the years 1952 and 1953, several white-tail were checked at the checking stations. None were checked in 1954.

Submitted by:

Name Joe Egan

Title Junior Biologist

Approved by:

Name Don L. Brown

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-59-R-2
DATE July 15, 1955
VOL. VI NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Completion Report

Investigations Project

Work Plan I Job Nos. I-D & I-E

Title of Work Plan: Population Studies of Big Game Species in Eastern Montana

Title of Jobs: Deer and Elk (Central)

DEER AND ELK TRAPPING AND TAGGING ON JUDITH GAME RANGE

PERSONNEL:

Bert Goodman, Game Range Manager
Bill Peary, Laborer
Jack Saunders, Junior Biologist

OBJECTIVES:

To trap deer and elk, and tag them for positive identification in future studies.

PROCEDURE AND FINDINGS:

The same live trap for elk was used this year as during 1953 - 1954. The methods of baiting, automatic trip, and daily checking were employed.

Again it was found that the alfalfa hay bait was not as satisfactory for elk as was the wild-grass type hay.

The type of tag used for both deer and elk was changed during part of the trapping season. The aluminum tags used for elk were the same as those used last year, but in addition to the aluminum tag, a plastic marker was used in one ear which would enable an observer to distinguish between animals tagged different years, and also to distinguish between different animals.

The plastic tags were constructed of heavy (.040" outer symbol - .030" inner) sheet plastic cut into easily recognized shapes. A series of markers, using shapes and colors which were thought to be easily seen in the field, were fabricated. The number of

combinations was doubled by using either the right or left ear.

A field data card (Figure I) was set up in order to obtain data pertaining to the age by incisor replacement, sex, antler condition of males, metal tag numbers, plastic tag design and the date the animal was tagged.

Code _____	SEX M / F
AGE & TEETH	ANTLER CLASS
____ Calf-TTTTTTTT	Spike _____
____ Yrlg-TTTTTTTT	Raghorn _____
____ Yrlg-TTTPPTTT	Full Rack _____
____ 2 $\frac{1}{2}$ -DM badly worn &/or PM straw colored	Other _____
____ Other	Plastic
Tag No. _____	R _____
	L _____
Remarks:	
DATE: J/F/M/Ap/My/Ju/Jl/A/S/O N/D/1/2/3/4/5/6/7/8/9/0	

ELK

Code _____	SEX M / F
TEETH	REMARKS
T C P	DATE
	J 1
	F 2
T I P	M 1
	A 2
T I P	M 3
	JU 4
T I P	JL 5
	A 6
_____	S 7
T I P	O 8
	N 9
T I P	D 0
	Plastic
T I P	Tag No. _____ R _____
T C P	_____ L _____

DEER

FIGURE I

FIELD DATA CARDS USED IN ELK AND DEER TAGGING

The same procedure was used for deer, except a smaller, lighter metal tag was used. The incisor condition was also recorded differently.

It is felt that the mild weather and light snow conditions in the area during the past winter account in a large part for the relatively poor results of the trapping operation this year

as compared to the 1954 trapping season.

The results of the trapping and tagging are given in Tables I and II.

TABLE I

TAG NUMBERS USED ON ELK AT THE JUDITH RIVER GAME RANGE DURING 1955

Date	Numbers		Animals Tagged						Recaptures
	Right	Left	Adults		Yearlings		Calves		
1955			Male	Female	Male	Female	Male	Female	
1/12	F 2983	<u>1</u> /		*					
	F 2985			*					
	F 2986			*					
1/22	F 2988			*					
	F 2989			*					
	F 2991			*					
1/25	F 2990			*					
	F 2992			*					
3/ 9	H 4011	H 4012						*	
	H 4007	H 4008		*					
	H 4005	H 4006		*					
	H 4003	H 4004		*					
	H 4013	H 4014				*			
	H 4009	H 4010				*			
3/12	H 4019	F 2970 <u>2</u> /		*	Repeat from 3/29/54				*
	H 4081	H 4080				*			
	H 4015	F 2920		*	Repeat from 1/30/54				*
	H 4079	F 2916		*	Repeat from 1/30/54				*
	H 4027	H 4028		*					
	H 4029	H 4030		*					
	H 4017	H 4018		*					
	H 4023	H 4024		*					
3/20	H 4031	H 4032		*					
3/29	H 4033	H 4034				*			
	H 4035	H 4036		*					
4/ 3	H 4041	H 4042		*					
	H 4037	H 4038		*					
	H 4039	H 4040		*					

TABLE I (Continued)

Date	Numbers		Animals Tagged						Recaptures
1955	Right	Left	Adults		Yearlings		Calves		
			Male	Female	Male	Female	Male	Female	
4/ 7	H 4043	H 4044		*					
	Also	F 2930		*	Repeat from 2/13/54				*
	H 4045	H 4046	*						
TOTALS			1	25		4	1		4

1/ Plastic was not available when the first eight animals were trapped, and only one metal tag was placed on the animals.

2/ F series tags were placed on the animals in 1954.

TABLE II

TAG NUMBERS USED ON DEER AT THE JUDITH RIVER GAME RANGE
DURING 1955

Date	Numbers		Animals Tagged						Recaptures
1955	Right	Left	Adults		Yearlings		Calves		
			Male	Female	Male	Female	Male	Female	
2/12	911	908	*						
	909	906		*					
	905	904		*	Repeat from Feb. 1954				*
					Repeat again Feb. 28, 1955				*
	903	902	*						
2/22	913	910	*						
3/23	917	916		*					
					Repeat March 26, 1955				*
	919	918		*	Repeat from Feb. 1954				*
	915	914		*					
TOTALS			3	5					4

The analysis of the tag returns from hunters and recaptures during the 1954-1955 hunting season in the Little Belts Mountains will be written as separate report.

Submitted by:

Name Jack K. Saunders

Title Junior Biologist

Approved by:

Name Bert Goodman

Title Game Range Manager

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-59-R-2
DATE July 15, 1955
VOL. VI NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Completion Report

Investigations Project

Work Plan I

Job No. I-E

Title of Work Plan: Population Studies of Big Game Species in
Eastern Montana

Title of Job: Elk (Central)

CENSUS AND SURVEY OF ESTABLISHED ELK HERDS

DATES: February and March, 1955

PERSONNEL:

Robert Eng, Biologist
Jack Saunders, Junior Biologist
Don L. Brown, Warden Supervisor (Pilot)
Tom Hay, Game Warden
Waldo Vangsness, Game Warden
Bob Weintz, Sportsman

OBJECTIVES:

1. To determine the population of established elk herds in Eastern Montana in order to effect best management.
2. To improve and test census techniques that may be applied to various elk herds.

PROCEDURE AND FINDINGS:

The techniques used and areas flown were the same as in 1952, (Brown, Don L.*).

*Brown, Don L. Census and Survey of Established Elk Herds. Montana Fish and Game Commission Quarterly Report, Vol. III, No. 2, 1952.

The extremely late winter and absence of any appreciable amounts of snow made aerial surveys conducted during the usual counting period unreliable. Numerous trips were made into the Little Belts and Highwoods. Time was available for only one short trip to check the Judith Mountains. Weather conditions were not favorable for making repeated checks on any of the areas to determine the possible error in a single count.

A harvest of 400 animals was attempted in the Little Belts in the 1954-1955 hunting season. However, the checking station records and warden estimates gave a kill of 354 (209 actually checked and 145 estimated). The harvest for the Highwoods area was 117 out of 126 permits issued. The high hunter success in this area was largely due to the extension of the season into January when the elk were on lower more open range.

A collection of the lower jaws of elk killed by hunters was made in the field and at the checking stations. The sample was too small to be adequate for indicating the age composition of the kill. Some of these jaws were used to make jaw boards for use at checking stations in the future and for use in trapping and tagging operations.

Ovaries were collected and fetal counts were made during the special seasons and extended seasons on either sex elk. This will be continued in the future and a report of the findings will be made when a comparison of different years can be made.

A tabulation of the counts made in the Little Belts, Highwoods and Judith Mountains is given in Tables I, II, and III. A six year summary of the counted populations is also given in Table III.

In Table IV the hypothetical populations determination for the Little Belt Mountains has been continued. There is a discrepancy of 145 animals between the calculated population and the counted population. This may be due to either the count, which as has been stated is subject to considerable error due to counting conditions, or harvest may have been greater than it was thought to be. This is also likely because a large part of the harvest was estimated.

TABLE I
LITTLE BELT MOUNTAINS

AREA	TOTAL ELK
Judith Game Range and vicinity	620
South Face Mountains	214
Otter Creek	47
Lost Fork	8
Running Wolf	8
Dry Wolf	12
Wood Chopper Ridge	9
Blacktail Hills	<u>33</u>
TOTAL	951

TABLE II
HIGHWOOD MOUNTAINS

AREA	TOTAL ELK
Gap Creek	4
Shonkin Creek	16
Shonkin Creek	21
East Shonkin Creek	77
East Shonkin Creek	8
East Shonkin Creek	22
East Shonkin Creek	25
Cottonwood - Shonkin Creek	6
Cottonwood Creek	25
Cottonwood Creek	22
Timber Creek	1
Timber and Warren Creeks	3
South and North Forks of Highwood Creek	71
Price Creek	19
East Peak	1
Martin Creek	15
North Fork Highwood	<u>3</u>
TOTAL	339

TABLE III
SIX YEAR SUMMARY OF ELK POPULATIONS

	1950	1951	1952	1953	1954	1955
Judith River Area	585	488	756	609	803	737
Musselshell River Drainage	<u>307</u>	<u>309</u>	<u>318</u>	<u>253</u>	<u>251</u>	<u>214</u>
Little Belts Totals	892	797	1074	862	1054	951
Highwood Mountains	282	132**	455	309	336	339
Judith Mountains	80-Est.---		58-Inc.	40-Inc.	---	---

TABLE IV
POPULATION DETERMINATION

	1952	1953	1954	1955
Spring Aerial Count	1074	862	1054	951
Increase (36.8%)*	<u>395</u>	<u>317</u>	<u>388</u>	<u>350</u>
Computed Fall Herd	1469	1179	1442	1301
Harvest	<u>-583**</u>	<u>-145***</u>	<u>-354***</u>	
Computed Surviving Population	896	1034	1088	

- * Based on 1952 season kill classification.
 ** Checking stations count.
 *** Checking stations count plus warden estimates.

CONCLUSIONS AND RECOMMENDATIONS:

It is recommended that particular emphasis be put on obtaining the number of animals harvested during the coming year. This should be done in order to check the population in the winter of 1956 so that the "calculated population" work can be continued as accurately as possible.

The work on the collection of ovaries and fetal counts should also be continued so that a check of the reproductive potential can be made.

The range condition of the Judith River Game Range seems to be good and the native grasses are invading the previously cultivated areas. Plans have been made to obtain quantitative data on the forage conditions in the area.

Submitted by:

Approved by:

Name Jack K. Saunders

Montana State Fish and Game Department

Title Junior Biologist

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

Approved by:

Name Don L. Brown

Title Senior Biologist

STATE Montana
PROJECT NO. W-59-R-2
DATE July 15, 1955
VOL. VI NO. 2

FINAL REPORT

For

INVESTIGATIONS PROJECTS

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: Eastern Montana Big Game Surveys

2. Personnel: Don L. Brown
Robert L. Eng
Joe Egan
Jack Saunders
Glen Cole
Student Assistants

3. Completion Report:

Work Plan I: Population Studies of Big Game Species in Eastern Montana

I-E: Elk

1. Central Montana

Fort Peck Game Range-The Pines Area: Work in this area has been rather sporadic due to insufficient man-power. About the middle of March, 1955, on two different occasions the following elk were observed during aerial surveys; 31 elk, one of which was a spike, and 17 elk of which five were spikes. Around March 23, 1955, 42 elk were observed by Deputy Warden Pete Quiring of Fort Peck, Montana. Again on April 24, 1955, 28 elk were observed from an auto by Mr. Quiring. A biologist was assigned to this area (Northeastern Montana) but resigned before much work was accomplished.

Submitted by:

Name Joe Egan

Title Junior Biologist

Approved by:

Name Don L. Brown

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE Montana
PROJECT NO. W 59-R-2
DATE July 15, 1955
VOL. VI NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Completion Report

Investigations Project

Work Plan I

Job No. I-G

Title of Work Plan: Population Studies of Big Game Species in Eastern Montana

Title of Job: Goats (Central)

STATUS AND DISTRIBUTION OF INTRODUCED ROCKY MOUNTAIN
GOAT HERDS IN CENTRAL MONTANA
(SNOWY MOUNTAINS AND SQUARE BUTTE AREA)

DATES: July and August, 1954

PERSONNEL:

Don L. Brown, Senior Biologist (Pilot)
Jack K. Saunders, Junior Biologist
Glen F. Cole, Junior Biologist

OBJECTIVES:

To determine the status and distribution of mountain goats in the Snowy Mountains and the Square Butte area.

FINDINGS AND DISCUSSION:

Three aerial flights were made in the Snowy Mountains area in order to determine the numbers of goats present and their distribution from the release sites. To date, 20 mountain goats have been released in the area. None of the animals were observed from the air. However, the forest ranger in the area reports that several grazing permittees have seen goats while moving livestock in the area.

During August, ground observations were made in the Square Butte area. A total of five adults and two kids was observed on the butte, and a single animal was observed on a smaller butte to the south. The two kids appeared to be twins, since they and the adult were about one-half mile from any other goats.

Ranchers in the area have reported seeing as many as 22 different animals in one day and also several have been seen in the Highwood Mountains. On the lower part of the area, there was evidence of heavy use in the past on some of the browse (Prunus, Rhus, and Symphoricarpos). This could not be directly attributed to goats because of the concentration of antelope, deer and livestock in the area.

Submitted by:

Name Jack K. Saunders

Title Junior Biologist

Approved by:

Name Don L. Brown

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE Montana
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FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: Eastern Montana Big Game Surveys

2. Personnel: Don L. Brown
Robert L. Eng
Joe Egan
Jack Saunders
Glen Cole
Student Assistants

3. Completion Report:

Work Plan I: Population Studies of Big Game Species in Eastern Montana

I-S: Sheep

2. Southeastern Montana

Results of a survey during August, 1954 were reported and can be referred to in the P-R Quarterly Report for the project year 1954-1955 (W-59-R-2). Time, weather and man-power did not permit extensive work to be carried on in the area. However, an aerial survey was attempted on April 6, 1955. Snow cover was excellent but no sheep were observed. No work has been carried on regarding the investigation of future sheep transplant sites.

Submitted by:

Approved by:

Name Joe Egan

Montana State Fish and Game Department

Title Junior Biologist

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

Approved by:

Name Don L. Brown

Title Senior Biologist

STATE Montana
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FINAL REPORT
For
INVESTIGATIONS PROJECTS

As Required By

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: Eastern Montana Big Game Surveys

2. Personnel: Don L. Brown
Robert L. Eng
Joe Egan
Jack Saunders
Glen Cole
Student Assistants

3. Completion Report:

Work Plan II: Investigation and Surveys of Big Game Ranges of Eastern Montana

II-A: Antelope

2. Southeastern Montana

Because of the area involved and the man-power available, range work regarding antelope has been very general. Some of the work is accomplished during the spring census work. In the over-all standpoint range conditions are good. Conflicts occur in stands of alfalfa, wheat, corn and hay meadows. Some of the accusations are unfounded but sufficient data has not been accumulated to disprove the complaints. Information in Mr. Glen Cole's study in Central Montana will be applied in this area where applicable.

Submitted by:

Name Joe Egan

Title Junior Biologist

Approved by:

Name Don L. Brown

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-59-R-2
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FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: Eastern Montana Big Game Surveys

2. Personnel: Don L. Brown
Robert L. Eng
Joe Egan
Jack Saunders
Glen Cole
Student Assistants

3. Completion Report:

Work Plan II: Investigation and Surveys of Big Game Ranges of Eastern Montana

II-D: Deer

2. Southeastern Montana

Range work regarding deer areas has been limited to field observations. Here again for the most part, rancher tolerance will necessarily keep deer below the numbers detrimental to the range. Exceptions being: the Long Pines area (Carter County) where overbrowsing is evident by white-tail; the Ashland district shows some evidence of heavy utilization on browse by deer, but the areas are small and scattered. During the August, 1954 Missouri River Breaks Mountain Sheep survey, forage conditions for deer were noted. To date this area is in good to excellent condition.

Submitted by:

Name Joe Egan

Title Junior Biologist

Approved by:

Name Don L. Brown

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE Montana
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FEDERAL AID IN WILDLIFE RESTORATION ACT

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Student Assistants

3. Completion Report:

Work Plan II: Investigation and Surveys of Big Game Ranges of Eastern Montana

II-S: Sheep

2. Southeastern Montana

During the August, 1954 survey in the Billy Creek area, range conditions were noted, and found to be in very good condition. A heavy snow-fall in April, 1955, should give the vegetation a good start for the 1955 growing season. Time and man-power has prevented further study regarding range in this area.

Submitted by:

Approved by:

Name Joe Egan

Montana State Fish and Game Department

Title Junior Biologist

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

Approved by:

Name Don L. Brown

Title Senior Biologist

STATE Montana
PROJECT NO. W-59-R-2
DATE July 15, 1955
VOL. VI NO. 2

Title of Project: Eastern Montana Big Game Surveys

Leader: Don L. Brown

Job Completion Report

Investigations Project

Work Plan III Job No. III-D

Title of Work Plan: Special Studies (Deer)

Title of Job: Food Habits and Range Use of the Mule Deer on
the Judith Game Range and Immediate Vicinity

OBJECTIVES:

1. To obtain mule deer food habits information in the game range area
2. To obtain information relative to seasonal movements and game range use of the deer.

PROCEDURE AND FINDINGS:

Work was begun in early July with the month following being devoted full time to this project. Thereafter until mid-October, time spent on this work was of an intermittent nature.

A collection of plants found in the game range area has been started. These plants were systematically collected to insure a better representation of the vegetation in this area.

About seventy species of plants have been collected on the game range, forty of which have been mounted, identified and given a protective coating of plastic spray. All plants have been pressed. Those which were identified were done so with the aid of the herbarium at Montana State College and were verified by Dr. W. E. Booth.

It is intended that these plants be left at the game range as part of a permanent collection of plants occurring in the area.

Observations were made in an attempt to determine

the numbers and habits of deer summering on the game range.

It is believed that approximately eleven deer summered on, or in the immediate vicinity of the game range, suggesting that the majority of the deer which winter on the game range summer at higher elevations.

Feeding site examinations were attempted but this method was considered unsatisfactory in itself due to the difficulty in determining the actual plants being utilized. It is felt that this information would be biased in favor of the more conspicuous plants and therefore should be used as supplementary data.

A deer trap has been erected on the game range. All deer trapped will be tagged with stock-type metal ear tags and plastic individual recognition markers for movement study use.

Harold Picton, student assistant, who is assigned to this project will enter the Air Force.

Because of reduced man-power additional work on this project is not proposed at this time.

Submitted by:

Name Harold Picton

Title Student Assistant

Approved by:

Name Don L. Brown

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana	
PROJECT NO.	W-60-R-2	
DATE	July 15, 1955	
VOL.	VI	NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: M. J. Rognrud

Job Completion Report

Job No. I-A

Investigations Project

Title of Job: Big Game Population and Herd Composition Survey

ABSTRACT

Mild winter conditions resulted in unsatisfactory field conditions for census work during the project period. Some aerial and ground counts were made late in the winter but results were of limited value to determine trends in population. More local census experience was gained and a mild winter distribution of big game was noted. Local records of minimum big game numbers were accumulated.

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PROJECT NO.	W-60-R-2	
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Title of Project: Western Montana Big Game Surveys

Leader: M. J. Rognrud

Job Completion Report

Job I-A

Investigations Project

Title of Job: Big Game Population and Herd Composition Survey

OBJECTIVES:

To census the important big game herds in western Montana for the purpose of determining distribution and density, trends in populations and to develop trend count methods in the various management units.

To determine the seasonal sex and age composition of major big game herds as a means of indicating their status, reproduction and productivity.

INTRODUCTION:

Mild winter conditions prevented a satisfactory survey of big game populations during the project period. A number of censuses were accomplished and the distribution of game was noted, but results were not comparable to former years due to the difference in field conditions. The counts were regarded as a local record of minimum numbers of animals in the census areas during the survey period. The population survey work consisted of a white-tailed deer strip census, aerial elk counts on ten winter ranges, an aerial moose count, and a mountain sheep ground census. A limited amount of herd composition records was obtained. The results of individual surveys are reported separately.

TECHNIQUES USED:

A modified strip census method was chosen to estimate the white-tailed deer population in the Swan River drainage. This method was chosen so that the results could be compared with strip censuses conducted in the same area in previous years.

Preliminary work on January 18, 19, 20 and 21, 1955, involved the outlining of the white-tailed deer winter range, the location of strips, and snow depth measurements. On January 26, and during census operations, the limits of the winter range were checked by plane to be certain that all parts of the winter range were sampled.

A timber type map of the Swan Valley was obtained with a view

toward correlating density of deer numbers with timber type. In order to adequately sample the various timber types, most of the strips were located at one-half mile intervals. In those areas where one type was predominant over a large portion, strips were located at one mile intervals.

Aerial reconnaissance indicated that deer range west of the Swan River was restricted to a rather narrow belt along the river bottom. Because of the difficulty involved in sampling this area, it was decided to sample the east side of the river bottom, the feeling being that results could very probably be applied to the west side. Consequently strips were run parallel to the river on the east side between the river and the Swan Valley road. This area had not been sampled previously.

Starting points of all strips were marked on the road with numbered signs. The locations of all strips are indicated on Map 1.

Prior to the counts, the census crew was assembled at Condon Ranger Station and the methods and objectives of the census were explained in detail. Each crew member was given a map indicating his strip route and a pocket notebook for recording data.

Data were recorded in a manner that would allow the results to be calculated on the basis of a strip two chains wide and of a strip equal in width to twice the average flushing distance of all deer flushed.

PERSONNEL:

I. White-tailed deer strip census, Swan River

A. White-tailed deer Census:

Dates: February 10-13, 1955

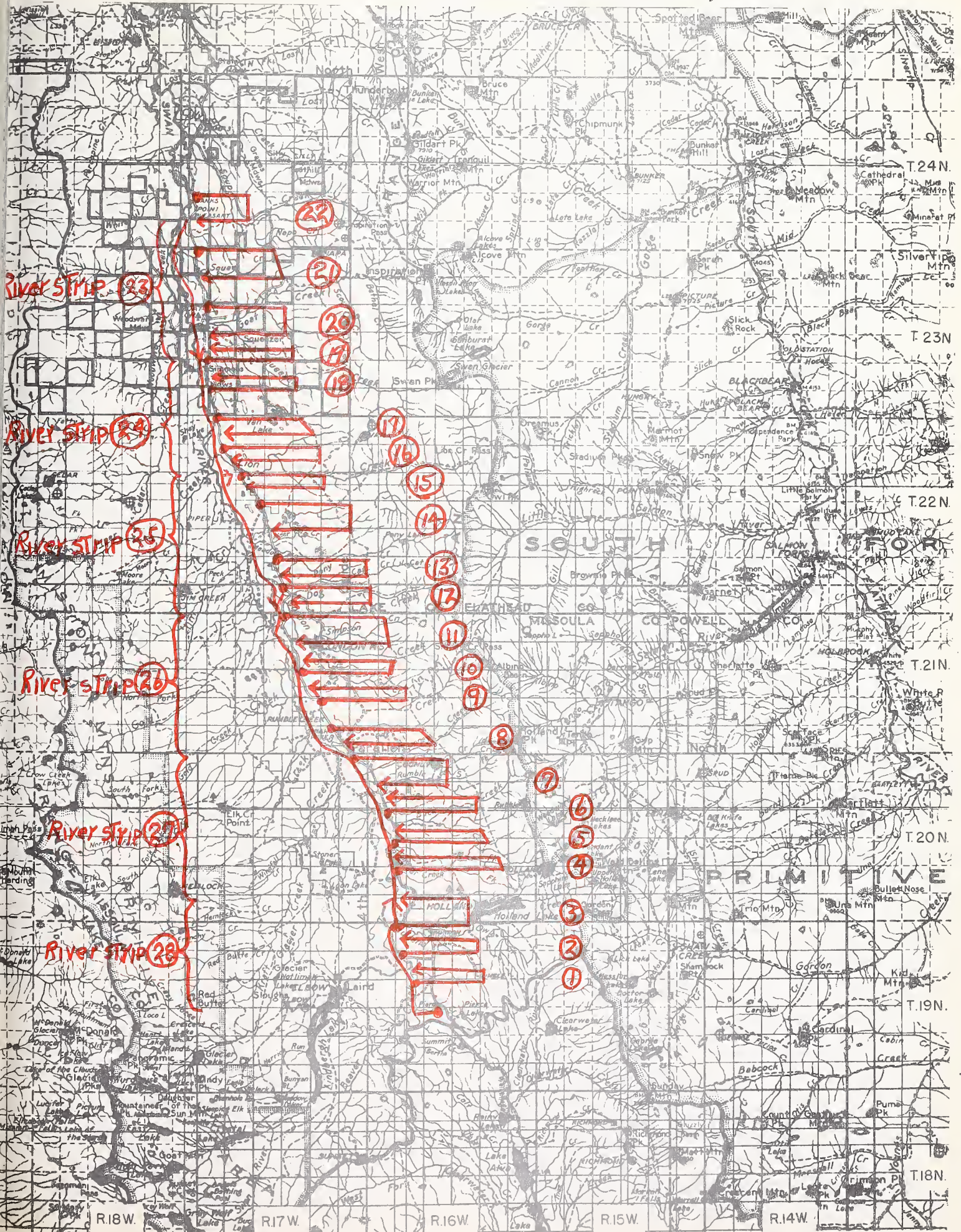
M. Rognrud	Montana Fish and Game Dept.
W. Woodgerd	" " " " "
R. Blair	" " " " "
P. Marshall	" " " " "
A. Geis	" " " " "
J. Dillon	" " " " "
O. Nollar	" " " " "
R. Lambeth	" " " " "
E. Sager	" " " " "
L. Deist	" " " " "
R. Thompson	" " " " "
J. Ford	" " " " "
R. Frey	U. S. Forest Service
H. McCarty	" " "

FINDINGS:

Twenty-seven strips totaling 149 miles were run. The winter range,

Upper Swan Unit

MAP 1: WHITE-TAILED DEER CENSUS STRIPS, 1955

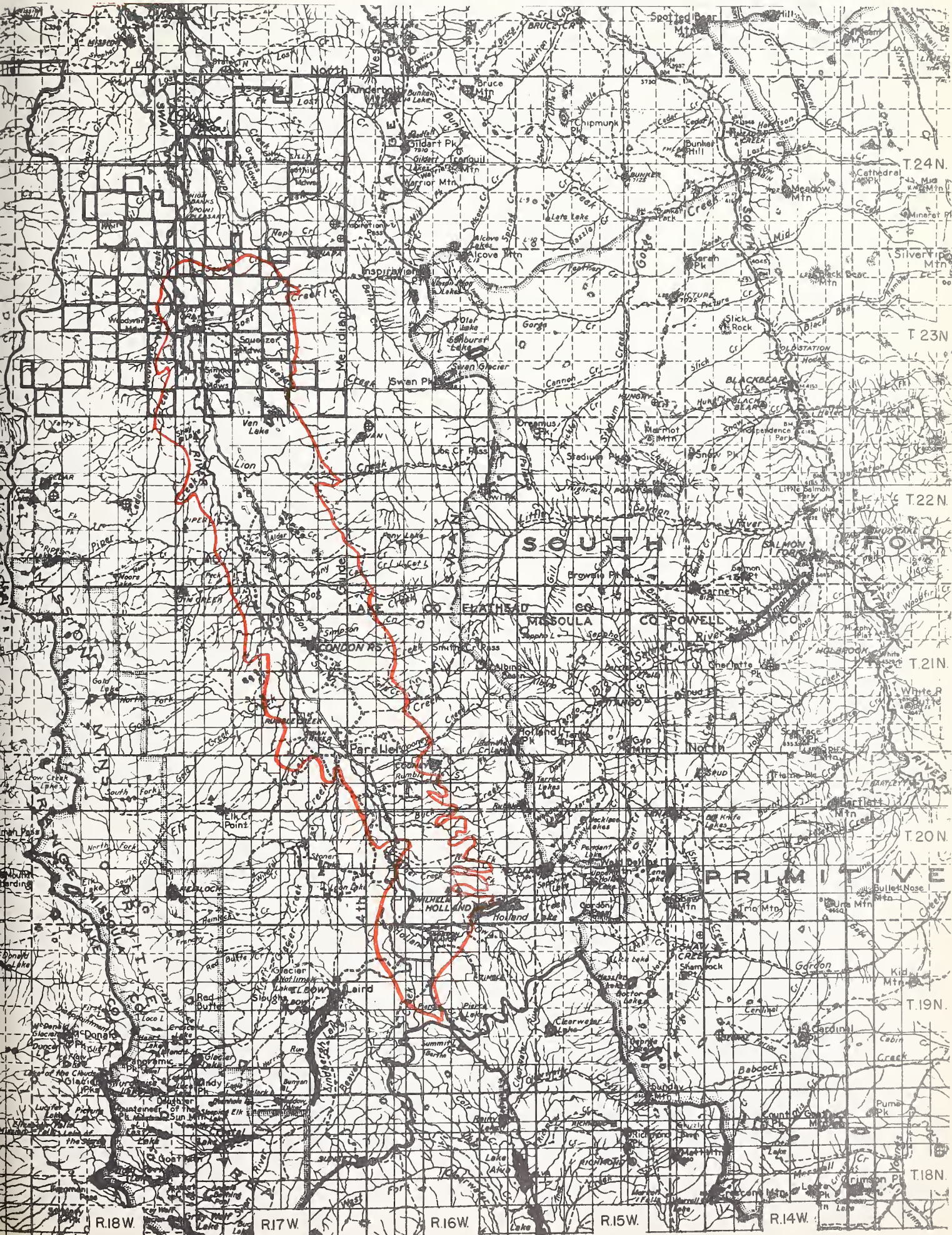




Winter Range
123.5 Sq. Miles
79,040 Acres

Upper Swan Unit

MAP 2: WHITE-TAILED DEER WINTER RANGE - 1955



after being plotted on Map 2, was measured with a polar planimeter and found to be about 79,000 acres. A summary of the data obtained is shown on Table 1. As with the strip censuses made in 1954 in Flathead County and eastern Lincoln County (Marshall, 1954) examination of the data indicated that a population estimate calculated by the two chain strip data would be more reliable than one calculated by the average flushing distance strip data. In addition, previous censuses used only the two chain strip data. Consequently, only the data of the two chain strip are presented.

TABLE 1

Summary of Swan River White-tailed Deer Census, 1955

Number of strips	37
Number of acres in sample	2384
Number of deer seen on strips	61
Number of acres per deer	39.1
Est. number of deer per section (sq. mi.)	16.37
Est. number of deer on winter range	2022

The density index of 16.37 deer per section indicates a relatively low density of white-tailed deer in the Swan Valley. During census work in this area in 1949, (Rognrud, 1949), a series of standard strips were established to facilitate comparison of past censuses with subsequent censuses. The 1955 census was adapted to this series and is compared with those of previous years in Table 2.

TABLE 2

Comparison of Swan River Strip Census Data of the Years 1943, '49, '51, & '55

<u>Year</u>	<u>Miles of Strip</u>	<u>Acres in Sample</u>	<u>Deer on Strip</u>	<u>Acres/Deer</u>	<u>Est. Deer/Sect.</u>
1943	87	1392	167	8.4	63.3
1949	120	1920	155	12.3	52.0
1951	70.5	1128	105	10.7	59.6
1955	69	1104	24	46.0	13.9

The density index (Est. Deer/Sect.) of 1955 is far below any of those of previous years. This apparent decrease in the density of white-tailed deer very probably may be attributed to a combination of factors. Field conditions when the counts are made may greatly influence the results obtained. A comparison of field conditions during the 1951 and 1955 censuses was made.

The 1951 census was chosen as a comparison with that of 1955 as it most nearly corresponded to the 1955 census in the length of time necessary to complete it. Both required three days of counting. In 1951, all three days were stormy with steady or intermittent snowfall. In 1955 all days were either clear or mostly clear. In 1951, snow on the ground averaged about ten

inches in depth and was soft or crusted with soft snow on top, while in 1955, the snow averaged about 17 inches in depth but was crusted so that a man traveling on snowshoes made quite noisy progress.

It may be seen then, that on days when travel was quiet, as in 1951, the chances of seeing deer were much better than on days when travel was very noisy as in 1955. As the strip census assumes that most, if not all, of the deer on the strip will be seen, snow conditions, or any other conditions that would allow deer to hear a man at a distance and move off without being seen, would introduce a great error into the census data. This type of error is considered a major one in strip census technique (Hayne, 1949).

There appears to be some evidence that white-tailed deer are not ^{as} numerous in the Swan Valley as in previous years. However, a decrease of the magnitude indicated between 1951 and 1955 (Table 2) appears to be unlikely. Checking station records for the 1952, 1953, and 1954 seasons, show fewer than 200 white-tailed deer taken by legal hunting each year, and the deer kill by Swan Valley residents probably does not exceed 150 deer during the hunting season. Large winter losses have not been noted during the past several years.

The strip census method of estimating white-tailed deer populations in Montana is thought to give conservative estimates of populations (Schmautz and Zajanc, 1949). It is doubtful if this census method, subject as it is to many errors, could reliably measure small but significant changes in population levels.

Density of White-tailed Deer by Timber Type

In the recording of field data, when deer were seen, the observer noted the timber type in the vicinity, recording first the most abundant species, then the next most abundant species and so on. In Table 3, the various timber types are shown, together with the number of deer seen in each. While each type is indicated by the two most abundant tree species present, each usually has one or more others present also. On occasion, several species seemed equally abundant.

TABLE 3

Number of White-tailed Deer Seen in Various Timber Types, 1955

<u>Type</u>	<u>No. of Deer Seen</u>
Spruce, Cottonwood	39
Yellow Pine, Douglas Fir	29
Larch, Douglas Fir	23
Lodgepole Pine	17
Douglas Fir, Lodgepole Pine	11
Spruce, Douglas Fir	<u>4</u>
Total	123

Too few deer were seen to allow definite conclusions to be drawn regarding the type preferred by deer. While the table indicates that more deer were seen in the Spruce-Cottonwood type than in any other, there is an indication that other types may be nearly as important.

In the valley as a whole, Douglas Fir is probably the most abundant species, although good stands of larch often occur with the fir. There are also large stands of lodgepole pine and considerable yellow pine in the valley.

Classified Counts

Again, too few deer were seen to provide a reliable index to the herd composition. Of 103 white-tailed deer that were classified, 61 were adults and 42 were fawns. On the basis of 100, an adult:fawn ratio of 100:68 was obtained. The limited data indicate a fairly high proportion of fawns.

B. Aerial Reconnaissance of Swan Valley

White-tailed deer and elk winter ranges

Dates: February 11, 12, 1955

Personnel: M. Rognrud and R. Cooper, Pilot

PROCEDURE: A total of 3.3 hours in a super-cub airplane were spent in the valley between the Swan-Clearwater divide and Lost Creek. Strips were flown at approximately one mile intervals westward from the Swan River and along the east foothills. Winter range boundaries were determined by the occurrence of tracks and plotted while flying.

OBSERVATIONS: Due to large areas of timberland without landmarks, and the difficulty of estimating distances away from the Swan River, as well as the scattered occurrence of tracks, and intermingling of deer and elk sign, it was not possible to plot white-tailed deer winter range accurately west of the Swan River. Similarly it was difficult to plot the eastern deer range boundary because of the occurrence of deer and elk sign at variable distances up the slopes of the Flathead Range.

Below normal snowfall in the Swan Valley had resulted in a wide and scattered distribution of big game. Deer occurred along the valley floor from Pierce Creek to Squaw Creek and at variable distances up the slopes of the Flathead Range particularly in the Smith Creek to Goat Creek area.

Map 2 shows the white-tailed deer winter range in the Swan Valley. Mule deer occur in the valley but their distribution is not well known.

Elk occurred along the valley floor in scattered bands but also along Lindberg Lake, upper Beaver Creek, Pierce Lake, and at elevations of 6000-6500 feet along the Flathead Range (valley floor about 3500')

in the vicinity of Lion Creek. Elk winter range is not continuous in the Swan and is not as well known as white-tailed deer range.

The ground and aerial work showed white-tailed deer occurred more commonly in the lower Swan drainage from Buck Creek northward to Squaw Creek. A concentration of deer was noted in the Squeezer Meadow-Van Lake area. Deer sign was common in the Lion Creek-Dog Creek areas. The burn west of Barber Creek, in the Cedar Creek area, did not have deer or elk tracks but sign was noted along the lower burn edges.

Some of the valley floor ridges between Holland Lake and Cooney Creek appeared to have minimum deer and elk sign on the flats and northerly exposures. Some tracks were seen in the south exposed forks of the above drainages. Deer sign was common along the Swan River proper.

No elk were found in the upper Elk Creek drainage. Elk summering in the Elk Creek and Cold Creek are very likely wintering lower in these drainages west of the Swan River. The lower drainages are in flat to rolling terrain with swamps and potholes making the water course indistinguishable when viewed from the air. Tracks were seen in parts of this area.

Although mild winter conditions prevailed, it was noted much of the country west of the Swan River except the lower mile or so along the drainage was not inhabited by big game. Evidence of elk pawing was seen frequently along the potholes in the Swan Valley.

CONCLUSIONS AND RECOMMENDATIONS: The population index obtained from this census is undoubtedly very conservative. If used with similar indices from previous years as an indication of trend in deer numbers, then there is a definite trend toward a lower population of white-tailed deer in the Swan Valley. However, as explained previously in this report, it is believed that while there may have been a reduction in deer numbers since 1951, the reduction was not as large as indicated by the census. The 1955 population index therefore should probably not be used even as trend data.

It is recommended that the strip census method of estimating white-tailed deer population in the Swan Valley be abandoned unless it can be modified in some way that will provide more reliable results.

Literature Cited:

Hayne, Don W., 1949

An examination of the strip census method for estimating animal populations. Journ. Wildl. Mgmt. 13(2):145-157

Marshall, Phillip B., 1954

Big game survey in South Fork, Middle Fork and North Fork of Flathead, Whitefish, Swan, Blackfoot and adjacent areas. Job Completion Report. Federal Aid Project W-60-R-1, April-June

1954, 153-177, Montana Fish and Game Commission.

Rognrud, Merle J. 1949

A study of big game in the Continental and adjacent units.
Final report, Federal Aid Project 1-R, May 1949. Montana Fish
and Game Commission.

Schmautz, Jack E. and Ade Zajanc, 1949

A study of the white-tailed deer population in the Fisher-Wolf Creek
area. Job Completion Report, Federal Aid Project 1-R, April-June,
1949, pp. 1-16 Montana Fish and Game Commission.

2. Elk Census, South Fork of Flathead River

Dates: March 5, 7 and 25, 1955

Personnel: R. Blair, Biologist
M. Rognrud, Biologist
R. Wilson, Warden Supervisor
R. Lambeth, Warden
P. Marshall, Biologist
R. Kelly, Pilot
R. Cooper, Pilot
R. Austin, Pilot

TECHNIQUES USED:

A 135 Super-cub and 180 Cessna airplanes were used to census elk.
The occupied winter range was inspected systematically to count
the animals and plot the winter range area during flight. Bulls
were recorded separately from cows and calves when groups could be
classified.

RESULTS:

The results of the aerial elk census were totaled by census units
(see pp. 155-157 April-June, 1954 Wildlife Restoration Division
Quarterly Report) for comparison with the count in 1954. The tab-
ulation below gives the elk counts in 1954 and 1955.

<u>Census Unit</u>	<u>No. Elk - 1954*</u>	<u>No. Elk - 1955</u>
Coram	5	21
Riverside	98	26
Elk Park	44	22
Sullivan Creek	61	52
Spotted Bear	871	395
Meadow Creek	58	8
Gorge Creek	100	65
Black Bear	352	105
Little Salmon	37	21
White River	96	351
Big Salmon	67	68
Gordon Creek	2	0
Big Prairie	134	46

<u>Census Unit</u>	<u>No. Elk - 1954*</u> (Continued)	<u>No. Elk - 1955</u>
Youngs Creek	85	147
Basin Creek	91	86
Danaher	<u>134</u>	<u>151</u>
TOTAL	2235	1564

* Highest total in each locality bases on two complete censuses.

The comparison of censuses shows a lower total count in 1955. The large difference in census results is attributed to a scattered distribution of elk due to relatively mild winter conditions in 1955. Changes in elk distribution are also noted in the sub-total counts of the various census units. Since the Flathead River has a considerable amount of timber, a lower count would be expected in a mild winter when elk are distributed over a larger winter range area.

The elk harvest has not changed markedly and winter mortality has been about normal, during recent years. It is estimated that the elk population has not changed greatly since a year ago.

The distribution of the elk in the South Fork is shown in Maps 1, 2 and 3. The area occupied by elk amounted to 159.4 square miles. Thus, a density of 9.8 elk per square mile at the time of the census was found. Relatively mild winter conditions prevailed in 1955 compared to 1954 when only 132.4 square miles of winter range was used.

RECOMMENDATIONS:

Aerial elk counts should be periodically continued in this important wintering area. It would be desirable to check the aerial counts in a relatively small area by intensive ground observations to estimate the proportion of elk censused by the aerial method.

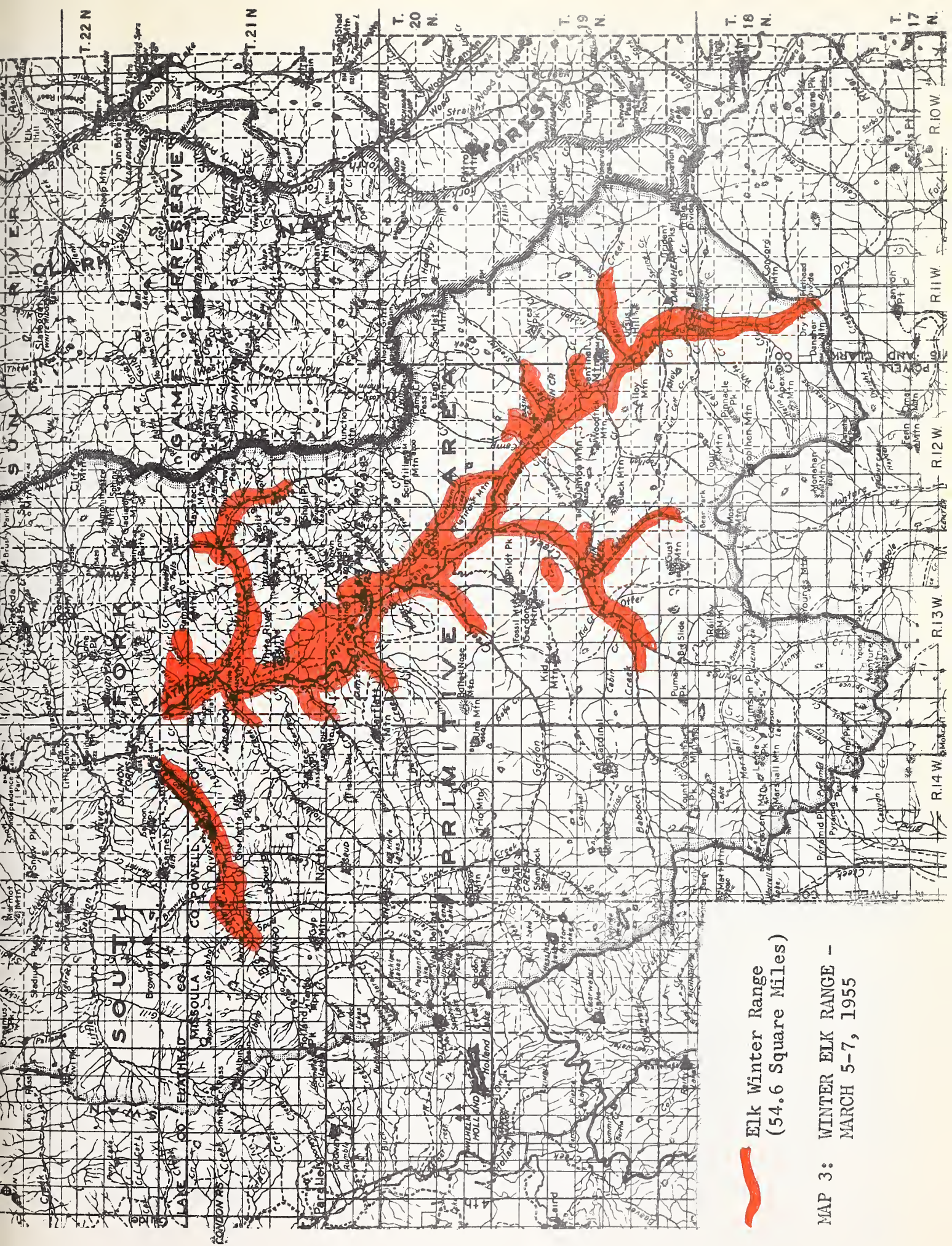
The ground crew could also obtain herd composition information to estimate productivity of the herd as well as to observe winter range conditions.

The movement and distribution of elk in the upper portion of the South Fork should be more accurately determined. A change in distribution of elk on different portions of the South Fork winter range is suggested by local counts of elk over a period of years.

3. Elk Census, Middle Fork of the Flathead River

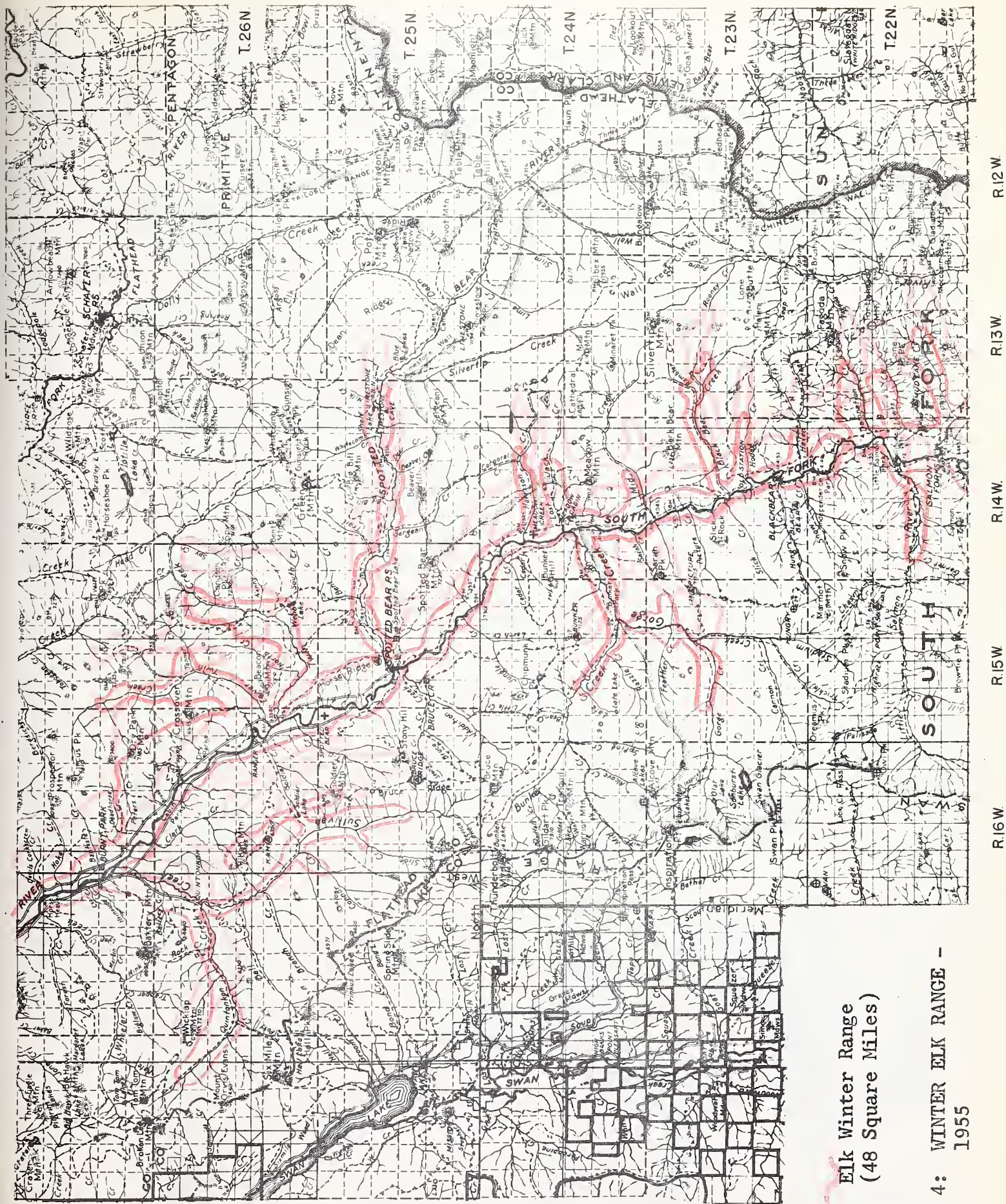
Date: March 25, 1955

Personnel: R. Kelly, Pilot R. Wilson, Warden Supervisor
 R. Blair, Biologist P. Marshall, Biologist



Elk Winter Range
(54.6 Square Miles)

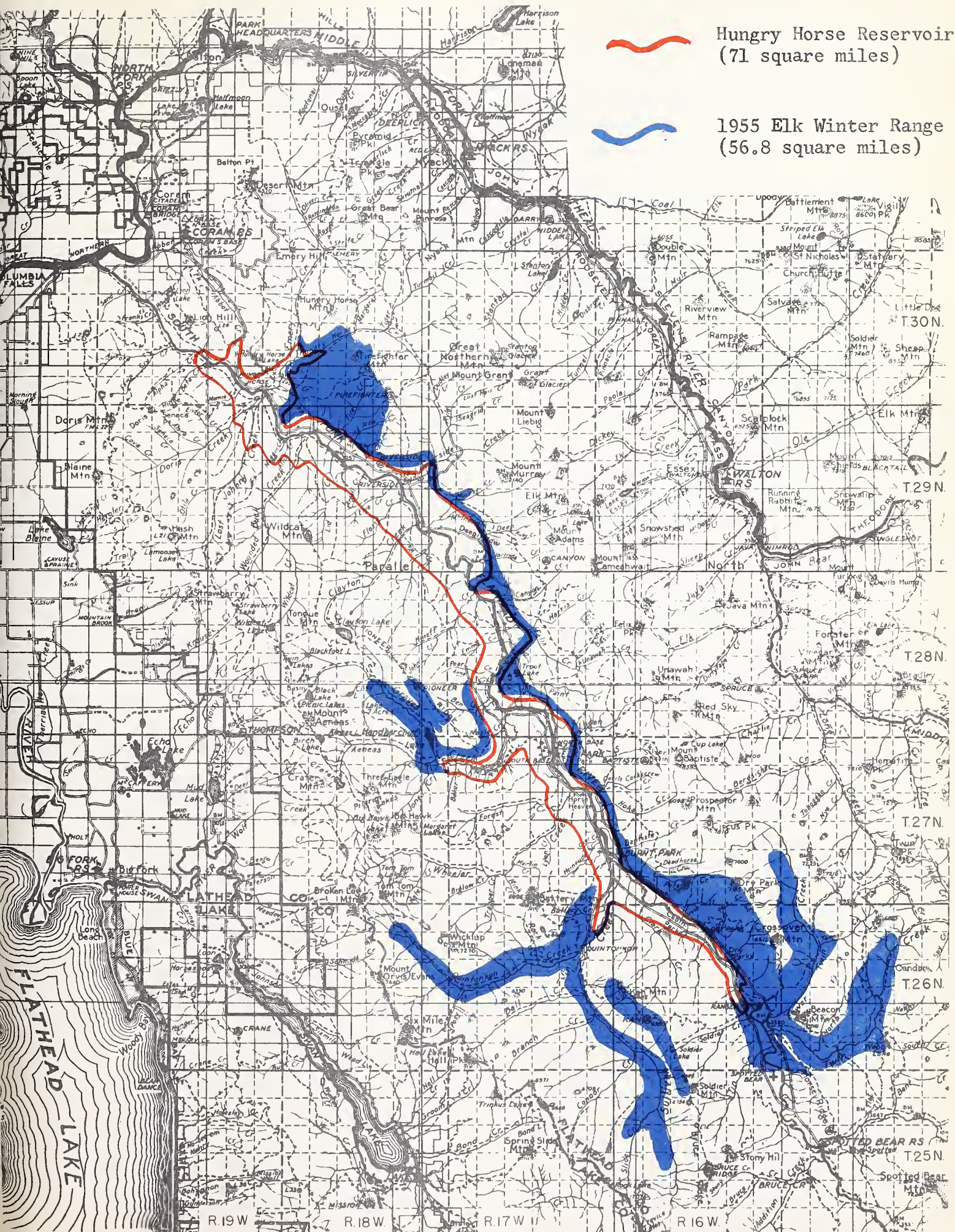
MAP 3: WINTER ELK RANGE -
MARCH 5-7, 1955



Elk Winter Range
(48 Square Miles)

MAP 4: WINTER ELK RANGE -
1955

Lower Swan Unit



MAP 5: LOWER SOUTH FORK OF THE FLATHEAD RIVER

TECHNIQUES USED:

Elk were counted from an airplane and the areas used by elk noted on a map. Elk were classified when possible.

RESULTS:

Results by locality (where available) are tabulated below with 1954 figures included for comparison.

<u>Census Unit</u>	<u>Number of Elk Counted</u>			
	<u>1952</u>	<u>1953</u>	<u>1954</u>	<u>1955</u>
Spruce Park	---	---	13	70
Granite	---	---	130	78
Schafer	---	---	33	34
Winter Creek	---	---	208	159
Total	392	313	384	341

The elk counts for the past four years suggest that this herd is fairly well stabilized. Some difference in annual counts could well be due to variation in census conditions.

Map 6 shows the winter distribution of elk in the Middle Fork. That portion of the range above Schafer is mostly a series of bare, wind swept ridges varying in altitude from about 5400 feet to 6500 feet. Below Schafer, the elk are confined to steep south and west facing slopes along the river and the larger creeks.

Observations in 1955 indicated there were 40.3 square miles of winter range and 8.5 elk per square mile present. This area compared to the 1954 winter range showed milder winter conditions occurred in 1955. Only 34.7 square miles of winter range were found in 1954.

RECOMMENDATIONS:

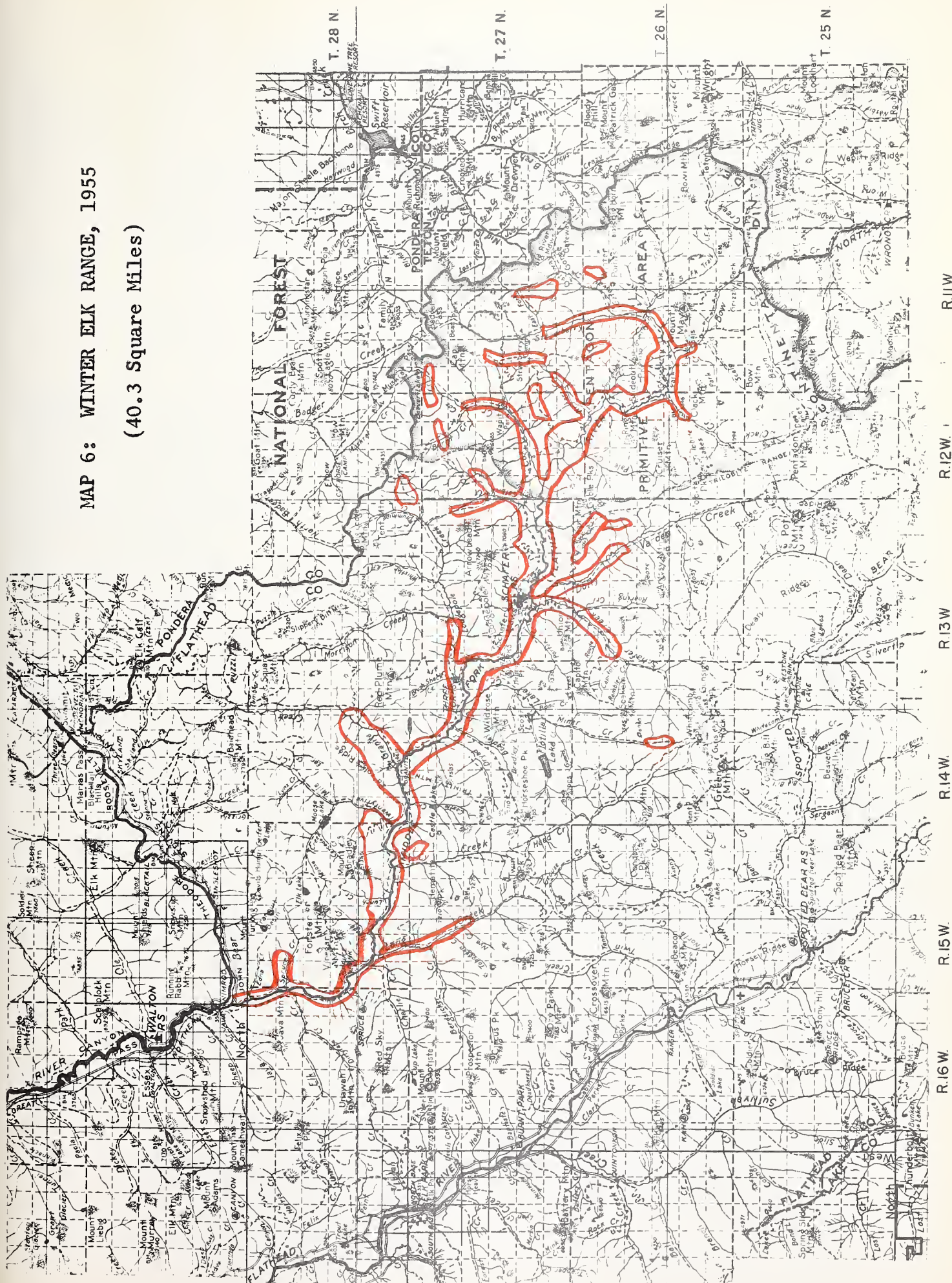
Aerial trend counts should be repeated periodically to follow the status of this herd. Attention should be given to census units and winter conditions to eliminate as many variables in the census method as possible.

An increase of the elk harvest of this herd would be desirable to crop a greater proportion of the annual increment. The status of the herd in relation to range conditions is not well known, but some reduction in herd size would probably be desirable, considering the limited area of suitable winter range available and the relatively rigorous winters that normally occur.

4. Elk Census in the Bitterroot Unit

Dates: February, March and April, 1955

MAP 6: WINTER ELK RANGE, 1955
(40.3 Square Miles)



Personnel: C. Taylor, Warden-Pilot
F. Hartkorn, Biologist

TECHNIQUES USED:

The elk were counted from an airplane in the Bitterroot Unit. Observations were made within two hours after sunrise only on clear cold days. Approximately twenty-five hours air time were spent over the elk ranges of the Bitterroot in 1955.

RESULTS:

Optimum counts in each locality are given below.

<u>Locality</u>	<u>Elk Counted in 1953</u>	<u>Elk Counted in 1954</u>	<u>Elk Counted in 1955</u>
Davis Mt. - Woodchuck Cr.	64	76	48
Woodchuck - Burnt Fork Cr.	1	27	12
Burnt Fork - Willow Cr.	137	95	82
Willow - Skalkaho Cr.	71	192	300
Skalkaho - Rye Creek	146	133	134
East Fork Drainage	366	524	677
West Fork Drainage	197	4*	43*
West Side	<u>0</u>	<u>66</u>	<u>33</u>
Total	982	1117	1329

*Partial counts only

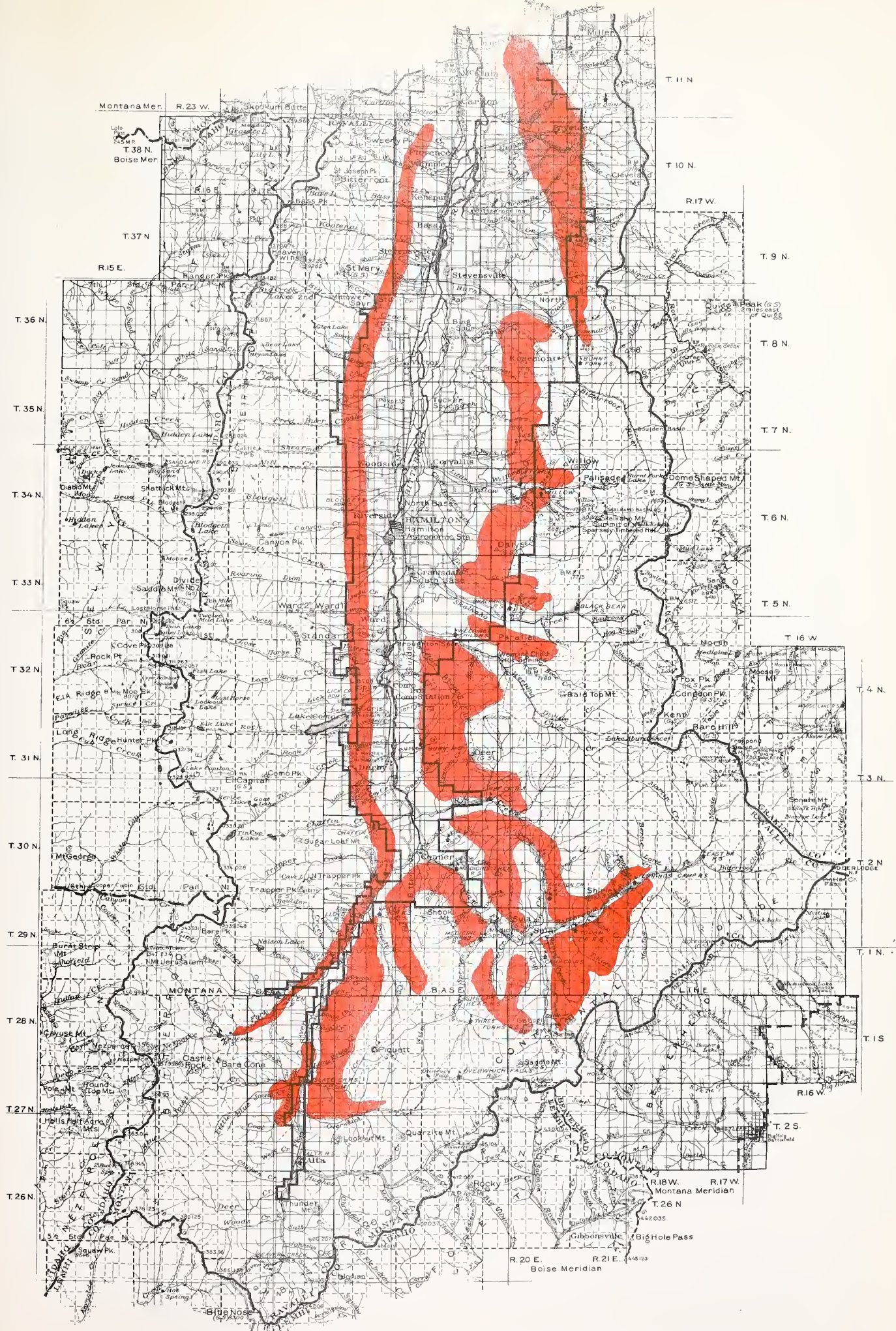
The aerial elk census of the east side and East Fork areas has been more intensive each year. However, other factors have been approximately standard so that the censuses are believed to reflect population trends. Therefore, the elk population is indicated to be higher in the East Fork and upper east side areas and lower north of Willow Creek and the west side areas.

Aerial elk census is believed to be moderately effective in the open foothill areas along the east side and in the East Fork, but is of limited effectiveness in the more heavily timbered west side and West Fork areas.

Approximate elk distribution during the winter of 1954-55 is shown in Map 7.

RECOMMENDATIONS:

It is recommended that aerial census of the elk ranges on the east side and East Fork be continued to provide elk population trend information. Any aerial observations on the west side or West Fork should be considered as only surveys for the presence of absence of big game.



MAP 7: AREAS WHERE ELK WERE OBSERVED DURING WINTER OF 1954-55
BITTERROOT UNIT

5. Elk Census Flint Creek Range

Date: March 8, 9, 16 and 25, 1955

Personnel: R. Austin, Pilot
M. Rognrud, Biologist
R. West, District Forest Ranger
Earl Johns, Sportsman
Stan Albert, Sportsman

TECHNIQUE USED:

Elk were counted from an airplane by repeated flights in the area.

RESULTS:

With consideration given to the possibility of duplication the best count in each locality is given below.

<u>Locality</u>	<u>Number of Elk Counted</u>	
Dundleberg Creek	66	
Tin Cup - Powell Creek	198	
Granite Creek	46	
Racetrack - Modesty Creek	134	
Timber Gulch	17	
Blue-eyed Nellie	10	
Olsen Gulch	14	
Foster Creek	14	
Cable Mt. Ridge	2	
Porter's Corner	29	
Stuart Gulch	36	
Garritty Mt.	150	(ground count)
Wards Gulch	11	
Mill Creek	<u>39</u>	
Total	766	

Although the count was less than the 804 tally in 1954, it was concluded that the elk population was approximately the same. Considering the 66 elk planted in Boulder Creek and Modesty Creek, it is recommended that provisions be made to increase the harvest of elk in the Flint Creek Range.

A change in winter distribution of elk was noted between the two census years. The distribution of elk and their reported movements indicates the Flint Creek Range should be considered as a unit for elk management. Distribution of elk found by the count in 1955 is shown by Map 8.

6. Elk Census, Little Blackfoot-Peterson-Dry Cottonwood Creek Area

Date: March 27, 1955

Personnel: R. Austin, Pilot
M. Rognrud, Biologist

TECHNIQUES USED:

Elk were counted from an airplane in the above areas.

RESULTS:

The elk count by locality is given below:

<u>Locality</u>	<u>Number of Elk Counted</u>
Elliston Creek	10
Hurd Creek	16
Trout Creek	3
East Fork Spotted Dog Creek	121
Head of Spotted Dog Cr.-Jake Cr.	61
East of Garrison	<u>10</u>
Total - Little Blackfoot	221
Peterson Creek-Dry Cottonwood Cr.	82
Girard Gulch	<u>27</u>
Total - Peterson-Dry Cottonwood Cr.	109

It is believed a quite reliable census was obtained in the area, as no signs of large bands of elk were found that were not counted. A total of 456 elk were counted in the Little Bitterroot segment in 1954. The decrease in elk indicated by the census confirms the reports of a heavy elk harvest in the Little Bitterroot area during the fall of 1954. Some change in distribution of elk also may have occurred. It is recommended that moderate hunting of this elk herd be continued.

7. Elk Census, Divide - Mill Creek Area

Date: March 25, 1955

Personnel: R. Austin, Pilot
M. Rognrud, Biologist

TECHNIQUES USED:

The elk were counted from an airplane in the above area.

RESULTS:

Results of the aerial census are given by localities below:

<u>Locality</u>	<u>Number of Elk Counted</u>
Divide Creek	88
Norton Gulch	67

<u>Locality</u>	(Continued)	<u>Number of Elk Counted</u>
German Gulch		130
Willow Creek		<u>47</u>
Total		332

The count indicates a significant part of the elk in the Fleecer Mountain area winter in the drainages north and west of the Continental Divide. Considering livestock and game pressure on this range it would be desirable to give more attention to the numbers of elk in relation to the amount of forage available in the area.

8. Elk Census, Upper Blackfoot

Date: March 26, 1955

Personnel: Ray Austin, Pilot
Merle Rognrud, Biologist

TECHNIQUE USED:

Elk were counted from an airplane on the above date.

RESULTS:

The elk counts are given by locality below.

<u>Locality</u>	<u>Number of Elk Counted</u>
Granite Butte	25
Poorman Creek	73
Humbug Creek	54
Black Diamond Creek	25
Horse Fly Creek	22
Willow--Anaconda Creek Divide	7
North of Rogers Pass	tracks only
Lewis and Clark Pass	50
Cadette Creek	17
Bartlett Creek	13
Landers Fork	30
Copper Creek	7
Keep Cool Creek	14
Park Creek	2
To mouth of Lincoln Canyon	<u>none seen</u>
Total	339

The count represents a minimum of elk known to winter in the upper Blackfoot River. More work is needed to establish census units and determine trends in the elk population.

9. Elk Census in the Lower Blackfoot

Date: March 16, 1955

Personnel: R. Austin, Pilot
M. Rognrud, Biologist

TECHNIQUE USED:

Elk were counted from the air on the above date. Periodic aerial counts were made during the winter of elk on Ovando Mountain and Markham and Mineral Mountains. Distribution of elk was noted and a tentative map of estimated elk winter range was prepared.

RESULTS:

The elk counts by locality are given below:

<u>Locality</u>	<u>Number of Elk Counted</u>
Spread - McCabe Creek	11
McCabe - Dick Creek	16
Ovando Mountain area	112 (218, best winter aerial count)
Coopers Lake area	5
Markham - Mineral Mountains	67 (140, best winter ground count)
Totals	211 (350, largest winter count)

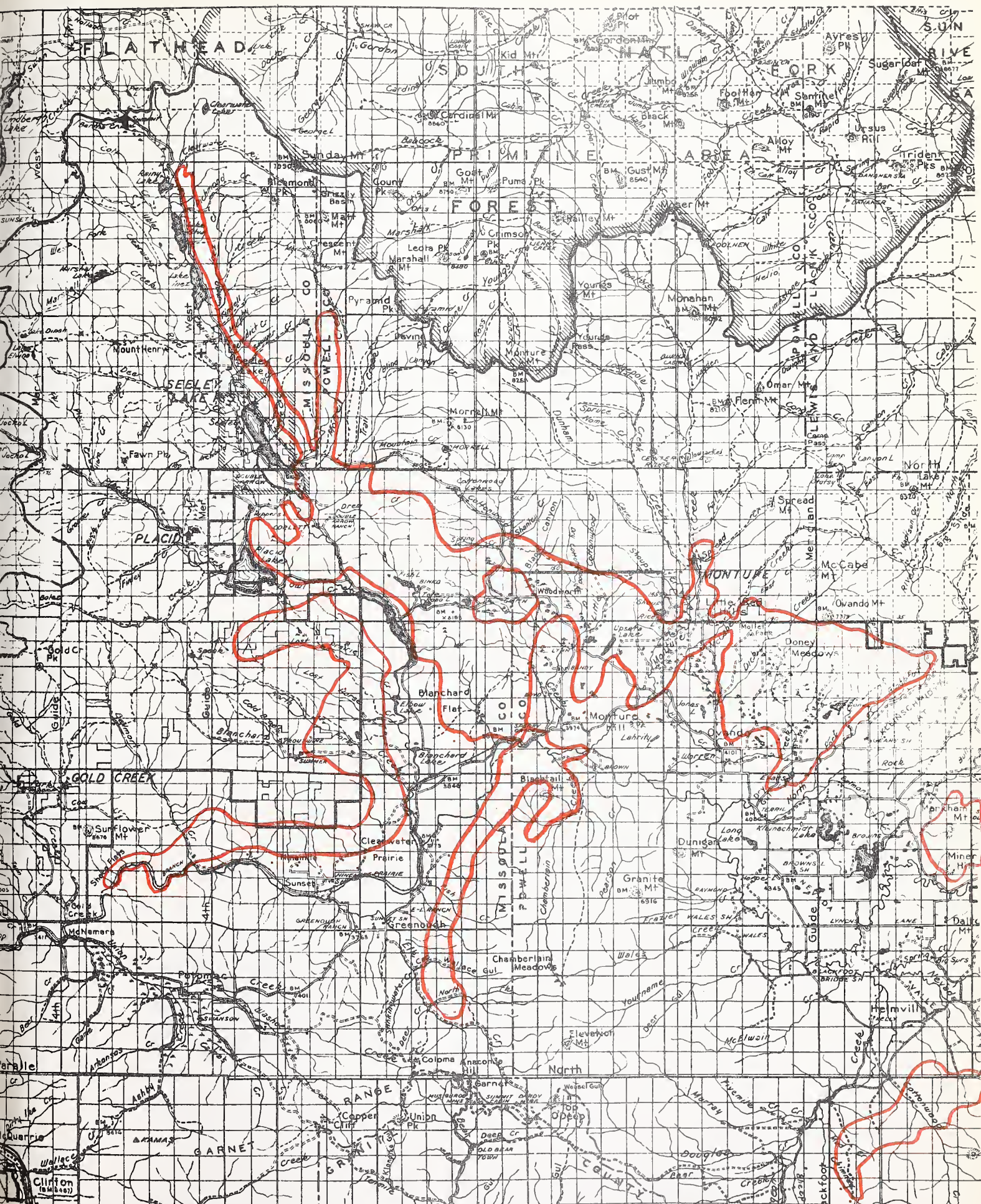
The total of 350 elk does not represent the minimum of elk known to winter in the Blackfoot area as it does not include those wintering on the Blackfoot-Clearwater Game Range and in that part of the Blackfoot drainage below the Clearwater River. No directly comparable aerial census data are available.

An aerial reconnaissance of the Blackfoot area was made March 27, 1955, and game distribution based on tracks and animals seen was determined. A tentative map of elk winter range was prepared on the basis of this reconnaissance and observations made while counting elk. The estimated winter range is shown by Map 9.

RECOMMENDATIONS:

The entire Blackfoot drainage should be divided into census units in order to obtain data that would be comparable from year to year. Classified counts should be made to determine herd composition and provide an indication of herd productivity. Range survey work is needed to relate elk numbers to available forage.

LOWER BLACKFOOT RIVER



MAP 9: ESTIMATED ELK WINTER RANGE, MARCH 1955

Ovando Mountain Elk Counts:

Periodic aerial counts were made of elk wintering on Ovando Mountain. The mountain area was covered carefully to prevent duplication and obtain accurate counts. Results were as follows:

<u>Date</u>	<u>No. Elk Counted</u>
1-14-55	145
1-26-55	133
2-19-55	218
3-16-55	112

The variation of elk counts in the Ovando Mountain area indicates the importance of proper census conditions in the field to a reliable trend count. Repeated counts would be desirable to obtain the most accurate results in determining any trend in population. The above counts actually represent the numbers of elk found along the open slopes of Ovando Mountain on the designated dates.

It is suggested that elk census work should be more carefully planned and the limitations of some census data should be well understood.

10. Elk Census in Nevada Creek Area

Date: March 26, 1955

Personnel: R. Austin, Pilot
M. Rognrud, Biologist

TECHNIQUE USED:

Elk were counted from an airplane in the Nevada Creek area.

RESULTS:

Results of the elk count are given below:

<u>Locality</u>	<u>Number of Elk Counted</u>
Dalton Mountain	7
Chimney Creek	27
Deer Creek	45
Buffalo Gulch	3
Washington - Nevada Creek	58
Mitchell Gulch	1
Ophir Creek	11
MacDonald Creek	<u>6</u>
Total	158

No comparative census data in this area is available. The

count was made as a reconnaissance of elk winter range in Nevada Creek. Results show that more attention should be given to the distribution of elk in the Nevada Creek area and the Blackfoot drainage as a whole in the future.

11. Elk Census, Drummond - Helmville - Avon - Garrison Area

Date: March 26 and 27, 1955

Personnel: R. Austin
M. Rognrud

TECHNIQUES USED:

The elk were counted from an airplane in the above area.

RESULTS:

Results are tabulated by locality below:

<u>Locality</u>	<u>Number of Elk Observed</u>
Braziel Creek	6
The Rhine	3
Hoover Creek	7
Bert Creek	9
Northeast of Drummond	12
Chimney Creek	11
Cottonwood Creek	38
Southeast Helmville	<u>30</u>
Total	116 (130 with track count est. in Braziel Creek)

This count was not considered satisfactory but is reported for value the records of local counts may have.

A count of 183 elk was made in this area in 1954. The trend of elk populations in this area should be observed because it is also important livestock range.

12. Moose census, Rock Creek, Granite County

Date: March 17 and 25, 1955

Personnel: R. Austin, Pilot
M. Rognrud, Biologist

TECHNIQUE USED:

Moose were counted from an airplane in the upper Rock Creek area.

RESULTS:

The numbers of moose counted are recorded by locality below:

<u>Area</u>	<u>Number of Moose Counted</u>
Gilbert - Cougar Creek	2
Hogback - Stony Creek	2
Stony Creek	2
Stony Creek - Upper Willow Creek	6
Upper Willow Creek	10
West Fork Rock Creek	13
Ross Fork Rock Creek	13
Middle Fork Rock Creek	12
East Fork Rock Creek	3
Marshall Creek	2
Lower Willow Creek	not counted
Total	65

Based on tracks where moose were not seen it was estimated that 100 to 115 moose were present in the area censused. The moose census was intended to be a reconnaissance of numbers in the Rock Creek area to be used as a guide in recommending hunting permits. It is recommended that periodic counts be made to estimate the size of the moose population in Rock Creek.

Distribution of moose seen is shown on Map 10.

13. Mountain Sheep County, Rock Creek, Granite County

Date: December 21, 1954

Personnel: Jim Ford, Game Warden
Clyde Howard, Game Warden Supervisor
Merle Rognrud, Biologist
P. B. Marshall, Biologist
P. L. Wright, Sportsman

TECHNIQUE USED:

The sheep range was covered in a systematic manner on foot and all sheep observed were recorded by sex and age when possible.

RESULTS:

Observations indicated a minimum of 56 sheep in the Rock Creek herd. There were at least 9 legal rams, 7 young rams ($2\frac{1}{2}$ or $3\frac{1}{2}$ years old), 25-30 ewes and yearlings, and 10-11 lambs. The five rams taken during the 1954 hunting season were young animals with approximately three-quarter curl horns. The

presence of older rams in the herd suggested a problem of locating the large rams during the hunting season.

RECOMMENDATIONS:

It is recommended that several ram permits be issued for the 1955 hunting season. Observations should be continued to follow the status of this herd as a result of hunting and attention should be given to the forage condition of the sheep range.

ELK HERD COMPOSITION

Elk were sexed whenever possible during aerial counts. This information is tabulated below.

Unit	Bulls	Cows & Calves	Ratio	
			Bull	Cow: & Calves
South Fork of Flathead	198	332	100	168
Middle Fork of Flathead	31	52	100	168
Upper Blackfoot	97	304	100	313
Lower Blackfoot	34	177	100	520
Flint Creek Range	150	352	100	234
Bitterroot	101	301	100	298

An accumulation of elk sex and age composition information would be desirable to understand the status of the different populations. The bull count probably can be obtained most accurately by aerial reconnaissance but ground work is needed to determine the proportion of cows and calves in the elk herds. The trend in sex and age composition of the elk herds as a result of hunting would be useful in recommending further management.

The results suggest that bulls are well represented in the herd, but more work is needed to understand what a normal proportion of bulls should be in the different herds.

SUMMARY:

A strip census method of estimating white-tailed deer numbers in the Swan Valley was conducted on February 10, 11, 12 and 13, 1955.

Twenty-seven strips totaling 149 miles in length were run through 79,000 acres of white-tailed deer winter range. The area in the sample was 2,384 acres and 61 white-tailed deer were seen on the strips.

A population index of 16.37 white-tailed deer per section was obtained.

In a comparison with population indices of previous years, the 1955 index was by far the lowest.

While there is some evidence of a reduced number of white-tailed deer in the Swan Valley, it is not believed that the reduction was as great as indicated by the census. Harvest losses and winter losses have not been heavy.

More deer were seen in the spruce-cottonwood timber type than in any other type, but the sample was small.

On the basis of limited observations, an adult:fawn ratio of 100:68 was obtained, indicating a fairly high proportion of fawns.

It was concluded that the population index obtained from the 1955 census data may not be reliable and that the strip census method should not be used in the Swan Valley area unless it can be modified to give more reliable results.

A total of 1564 elk was counted in the South Fork of the Flathead River. The count was appreciably lower than the 1954 census but difference in results was attributed to milder winter conditions in 1955 rather than to any significant change in population.

A total of 341 elk was found in the middle fork of the Flathead River. The population appears to be approximately stabilized.

One thousand and three elk were found in the upper and lower Blackfoot River, Nevada Creek, and other tributaries of the Blackfoot River. This number represents a part of the Blackfoot and Clearwater elk population.

The Flint Creek Range elk count resulted in a tally of 766 head. Changes in elk distribution occurred.

The Bitterroot elk census of 1329 animals suggested an increase in the elk population.

Three hundred and thirty elk were counted in the Little Bitterroot, Peterson and Dry Cottonwood Creek area.

The Mill Creek - Divide Creek elk herd had a minimum of 332 animals on the winter range.

A moose census in Rock Creek resulted in a count of 65 animals.

A minimum herd of 56 mountain sheep was found on the central Rock Creek range.

Elk herd composition data ranged from a ratio of 100 bulls:168

cows and calves to 100 bulls:520 cows and calves in six elk herds
of western Montana.

Prepared by:

Name Fred Hartkorn

Title Biologist

Approved by:

Name Merle Rognrud

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye Couey, Ass't Coordinator

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-60-R-2
DATE July 15, 1955
VOL. VI NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: M. J. Rognrud

Job Completion Report

Job No. I-C

Investigations Project

Title of Job: Big Game Movements and Migration

ABSTRACT

Elk and mule deer were trapped, tagged and released in two areas of western Montana during the past winter season. Fifteen elk and twelve mule deer were tagged at the Blackfoot-Clearwater Game Range. A total of 234 elk have been tagged at this location since 1951. Tag returns indicate a majority of the elk have been killed in the Game Range area but some elk migrate to the headwaters of the South Fork of the Flathead River. Thirty-two elk were trapped in the Bitterroot River headwaters. Limited tag returns suggested the East Fork elk herd ranges along the Bitterroot-Big Hole River divide in the fall and that some interchange of elk occurs on local winter ranges.

STATE Montana
PROJECT NO. W-60-R-2
DATE July 15, 1955
VOL. VI NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: M. J. Rognrud

Job Completion Report Job No. I-C Investigations Project

Title of Job: Big Game Movements and Migration

OBJECTIVES:

To study the movements and migrations of the important deer and elk herds in western Montana.

TECHNIQUES USED:

Semi-portable corral type traps baited with meadow hay and stock pellets (20% protein) were used to capture elk and deer during the winter. They were tagged with broad aluminum ear tags and released at the trapping site.

Publicity regarding the project was fostered to encourage the reporting of tagged animals killed by hunters.

FINDINGS:

Trapping and tagging was restricted to two areas of western Montana during the winter of 1954-55. Mild winter conditions made trapping difficult.

BLACKFOOT-CLEARWATER GAME RANGE

Fifteen unmarked elk and twelve unmarked mule deer were trapped and tagged during the winter of 1954-55, at the two traps located on the Blackfoot-Clearwater Game Range. Seven previously tagged elk were recaptured.

Twenty-nine elk tagged at the Game Range since 1951 were known to have been killed during the 1954 hunting season. Location of kill is given in Table 1 and shown on Map 1.

TABLE 1. Elk Tagged and Released on Blackfoot-Clearwater Game Range and Reported Hunter Kills of These Tagged Elk

Year Tagged	Number Tagged	No. Reported Killed by Hunters On or Near Game Range			No. Reported Killed by Hunters in S. Fk.			Total Recovery To date (%)
		1952	1953	1954	1952	1953	1954	
1952	143	6	2	8	0	0	3	13%
1953	10			1				10%
1954	66			5			1	9%
1955	15							
Total	234	6	2	14	0	0	4	

During the 1954 hunting season 10 of 40 tagged elk which had been transplanted on the Game Range the previous winter (Yellowstone Park elk) were reported shot on or near the Game Range. One elk released on the Game Range the winter of 1953 (Yellowstone Park elk) was killed near Avon.

EAST FORK OF BITTERROOT AREA

Twenty-nine elk and one mule deer were captured, tagged, and released at the trap south of the East Fork River during the late winter of 1954-55. Sixteen elk and one mule deer that had been previously tagged were recaptured. This makes a total of 62 elk and 4 mule deer tagged at this trap site.

A trap was operated on the ridge between Bunch Gulch and Horse Pasture gulch to sample the game herds wintering north of the East Fork River and east of the French Basin road. This site proved to be above the zone used by cows and calves with only big bulls staying on the ridge. Three bulls were trapped, tagged, and released. Three bulls were killed by other bulls while in the trap so trapping was terminated at this site. One of the bulls killed was a spike which had been tagged as a calf at the trap south of the East Fork River the previous winter.

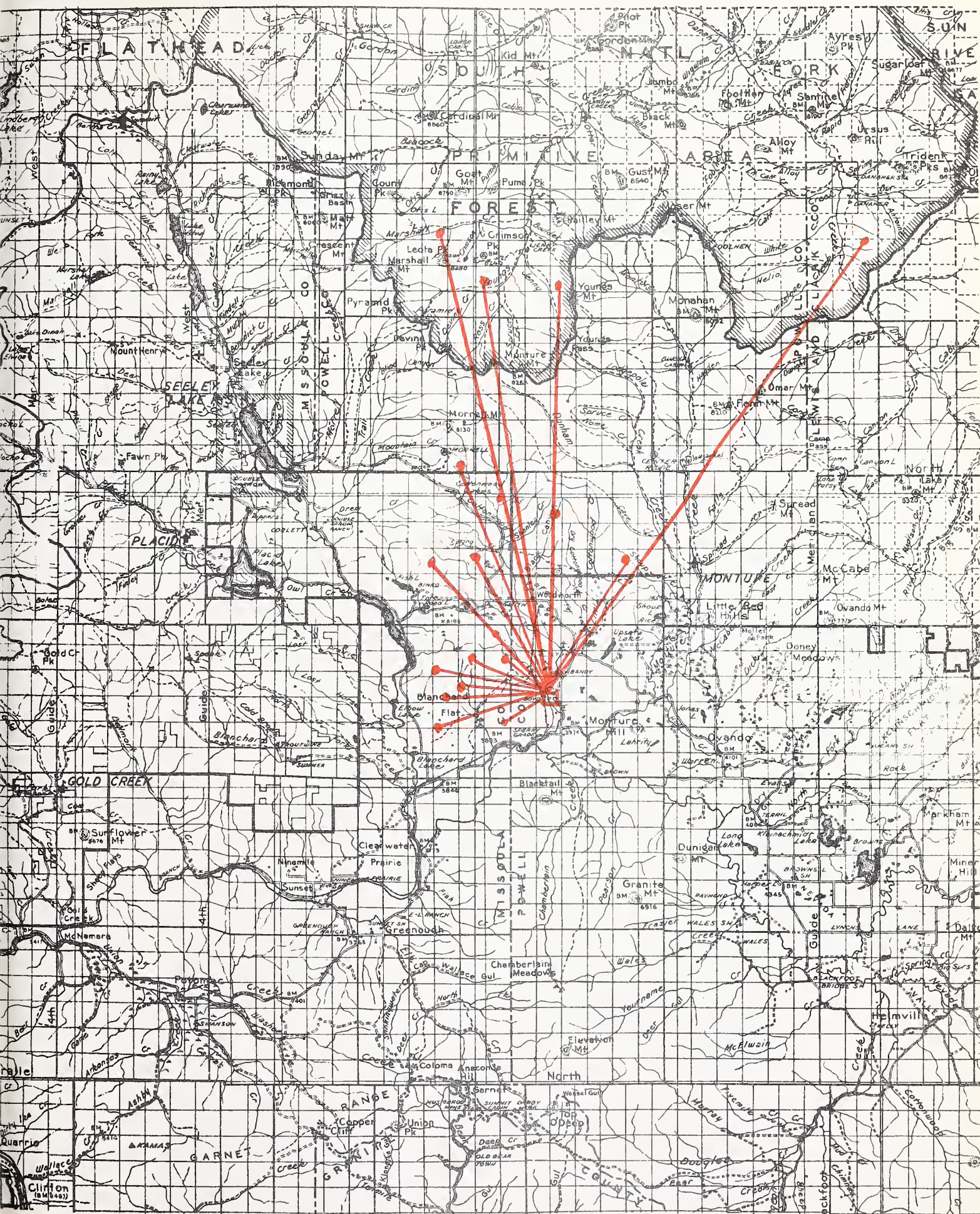
Three tagged elk were reported killed during the 1954 hunting season. All were killed in the upper aspects of Tolan and Meadow Creeks, the two drainages to the east of the trap site where they had been tagged the previous winter. Two of the three tagged animals were taken by hunters camped on the Beaverhead side of the divide, which indicates that probably a significant number of elk are taken in the Bitterroot other than those checked at the Darby Checking Station.

Location of traps and kills is shown in Map 2.

DISCUSSION: Blackfoot-Clearwater Game Range Area

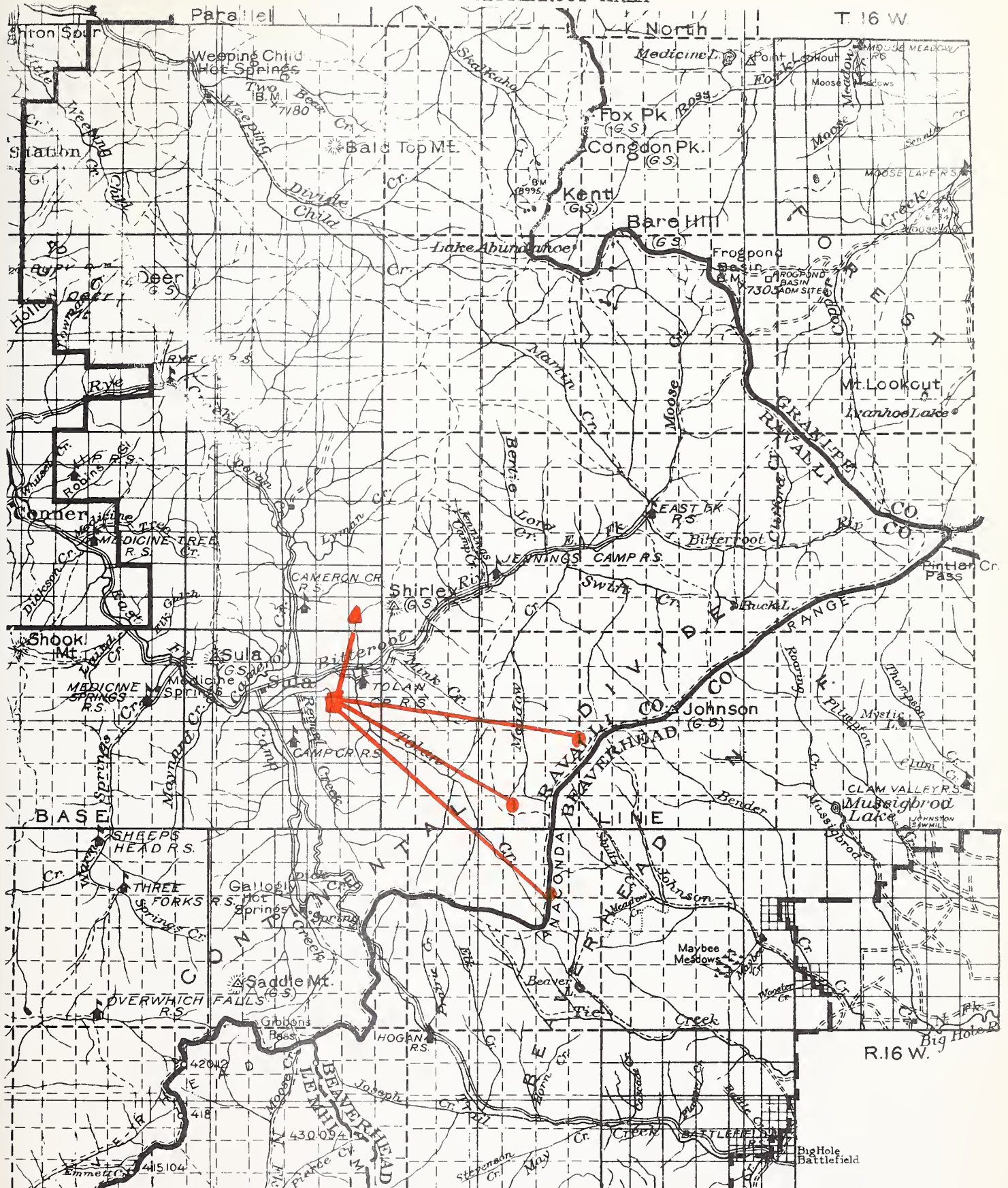
Findings to date indicate that: 1) many of the elk that winter on the Blackfoot-Clearwater Game Range are present on or near the Game Range during the fall and 2) some elk that winter on the Game Range are present in the upper aspects of the South Fork of the Flathead River drainage in the fall. Some elk may interchange winter ranges between the South Fork and Blackfoot during succeeding years.

MAP 1: ELK KILLED DURING 1954 HUNTING SEASON THAT HAD BEEN TRAPPED AND TAGGED ON BLACKFOOT-CLEARWATER GAME RANGE DURING THE WINTERS OF 1952, 1953 AND 1954



- Approximate location of kills
- Trapping site

EAST FORK OF BITTERROOT AREA



- Reimel Ridge elk trap
- Locations of tagged elk kills during 1954 hunting season
- ▲ Location of Bunch Gulch elk trap

MAP 2: EAST FORK OF BITTERROOT ELK TRAPS AND TAGGED ELK KILLS

At least 25% of the elk from Yellowstone Park transplanted on the Game Range in 1954 were harvested the following fall. Some of the transplanted elk tend to disperse a considerable distance following release.

East Fork Bitterroot Area:

Findings to date indicate that: 1) most of the elk that winter in the area south of the East Fork River are present at higher elevations of the same area during the hunting season, 2) some elk winter in different areas different years, and 3) a significant number of elk are killed in the East Fork drainage by people hunting from the Beaverhead side of the divide.

RECOMMENDATIONS: Blackfoot-Clearwater Area

It is recommended that elk, and deer on a coincidental basis, be trapped and tagged at the trap located on Boyd mountain to gain information regarding elk released in the area.

It is recommended that trapping be terminated at the trapping site just west of Game Range Headquarters. The 234 elk tagged and released at this site should be an adequate sample.

It is recommended that two traps be operated in the Ovando mountain area to determine facts regarding the fall range of this important elk herd. The operation of two traps is recommended to accomplish the study of elk movements in as short a period of time as possible.

East Fork of Bitterroot Area:

It is thought that an adequate sample of elk have been tagged in the area south of the East Fork River. Therefore, it is recommended that trapping be terminated at the Reimel ridge site.

To trap and tag approximately one hundred elk north of the East Fork of the Bitterroot River it is recommended that a trap on Bunch Gulch and a trap on Horse Pasture draw be operated. This number of elk should be caught in one winter if weather conditions are at least normal.

It is recommended that more emphasis be placed on the recovery of tags from animals killed during the hunting season.

SUMMARY:

Elk and deer were trapped, tagged and released in two areas in western Montana during the winter of 1954-55.

Fifteen elk and twelve mule deer were tagged on the Blackfoot-Clearwater Game Range. This made a total of 234 elk tagged and released there. To date 26 of these tagged elk have been reported killed by hunters.

Thirty-two elk and one mule deer were tagged in the East Fork of the Bitterroot area. To date four of these tagged elk have been reported killed.

Findings indicate: Blackfoot area - 1) many elk are on the Game Range in the fall, and 2) some interchange with the South Fork of the Flathead elk herd occurs. Bitterroot area - 1) most of the elk that winter south of the East Fork River are present near the Beaverhead-Bitterroot divide in the fall, 2) some interchange of wintering areas occurs, and 3) a significant number of elk are killed on the East Fork and taken out via the Big Hole River.

Recommendations are to continue trapping in two sites and to trap at two additional sites.

Prepared by:

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Title Biologist

Approved by:

Name Merle Rognrud

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

Date July 15, 1955

STATE	Montana
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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report

Job No. II-A

Investigations Project

Title of Job: Study of Range Condition and Forage Utilization

ABSTRACT

Forage utilization studies were conducted in two important big game winter range areas in the spring of 1955. In the Bowser Lake area browse use was found to be lighter during the winter of 1954-55 than it had been during the previous winter, with snowberry and Douglas fir making up over 70 per cent of the browse portion of the deer diet. In the Ovando Mountain area serviceberry and Ceanothus provided over 80 per cent of the browse portion of the elk and deer diet with utilization during the past mild winter near proper. A reduction harvest is recommended for the Bowser Lake area. A full or preferably slight reduction harvest is recommended for the herds using the Ovando Mountain area.

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DATE	July 15, 1955
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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. II-A Investigations Project

Title of Job: Study of Range Condition and Forage Utilization

OBJECTIVES:

To determine the utilization of forage and condition of important big game winter ranges in western Montana.

INTRODUCTION:

Only a very limited amount of work was accomplished on this job during the project year. No work was accomplished on the problem of determining range condition of important winter ranges because personnel were not available for this phase of the work plan.

Forage utilization studies were limited in scope because one member of the project resigned prior to the time this work was scheduled. An attempt was made to carry on a survey of browse utilization on two important winter range areas. Browse utilization data were collected on the Bowser Lake and Ovando Mountain big game winter ranges to comprise this report. A limited amount of information was obtained in regard to the location and area of winter range, but this is reported under Job I-A, Big game population and herd composition survey.

TECHNIQUES USED:

The method used was that described by Shaler Aldous, 1944 Jour. Mammology, 25(2): 130-136. This is an ocular estimate method for determining forage utilization.

Random evaluation plots were checked in the Bowser Lake Range about fifteen miles northwest of Kalispell where plots had been checked in 1954. Comparable browse utilization information was obtained in this area between the winters of 1953-54 and 1954-55.

Fifty random plots were checked in the Ovando Mountain area of Powell County.

FINDINGS:

Observations were made at three sites in the Bowser Lake Range.
The data obtained are presented below.

A. Immediate Vicinity of Bowser Lake

Number of Plots - 90

Occurrence in Plots

<u>Species</u>	<u>Total Occurrences</u>	<u>Total Density</u>	<u>Total Browsing Factor</u>
Snowberry	80	1932	500
Douglas fir	43	188	895
Spirea	13	191	230
Nannyberry	7	51	110
Serviceberry	2	7	5
Rose	6	10	5
Dwarf juniper	18	68	430
Lodgepole	8	76	480
Others (ocean spray, aspen, huckleberry, y. pine)	4 181	8	95 2750

<u>Species</u>	<u>% of Cover</u>	<u>Average Density</u>	<u>Average Utilz.</u>	<u>Utilz. Factor</u>	<u>% in Game Diet</u>
Snowberry	76.2	21.5	6.3	135.5	45.8
Douglas fir	7.6	2.1	20.8	43.7	14.8
Dwarf juniper	2.8	.8	23.9	19.1	6.5
Spirea	7.5	2.1	17.7	37.2	12.6
Lodgepole	2.8	.8	60.0	48.0	16.2
Nannyberry	2.1	.6	15.7	9.4	3.2
Rose	.3	.1	.8	.1	Trace
Serviceberry	.3	.1	2.5	.3	Trace
Others	.3	.1	23.7	2.4	.8

B. Big Lost Creek Area

Number of Plots - 50

Occurrences in Plot

<u>Species</u>	<u>Total Occurrences</u>	<u>Total Density</u>	<u>Total Browsing Factor</u>
Snowberry	44	440	125
Douglas fir	22	222	152
Rose	9	23	135
Ninebark	19	422	160
Serviceberry	13	46	465
Mt. maple	5	10	175
Spirea	12	20	37
Dwarf juniper	5	8	67
Others (willow, philadelphus, holodiscus, chokecherry)	7 136	32	275

<u>Species</u>	<u>% of Cover</u>	<u>Average Density</u>	<u>Average Utilz.</u>	<u>Utilz. Factor</u>	<u>% in Game Diet</u>
Snowberry	36.2	8.8	2.8	24.6	13.7
Douglas fir	18.0	4.4	6.9	30.4	17.0
Ninebark	34.5	8.4	8.4	70.6	39.5
Serviceberry	3.7	.9	35.8	32.2	18.0
Spirea	1.6	.4	3.1	1.2	.7
Rose	1.9	.5	15.0	7.5	4.2
Mt. maple	.8	.2	35.0	7.0	3.9
Dwarf juniper	.8	.2	13.4	2.7	1.5
Others	2.5	.6	3.9	2.3	1.4

C. Beaver Creek Area
Number of Plots - 70
Occurrence in Plots

<u>Species</u>	<u>Total Occurrences</u>	<u>Total Density</u>	<u>Total Browsing Factor</u>
Douglas fir	40	136	1065
Snowberry	68	1380	495
Serviceberry	24	99	715
Spirea	21	168	141
Nannyberry	10	38	170
Dwarf juniper	9	57	215
Rose	8	14	5
Others (y. pine, ribes, maple)	6	36	355
	186		

<u>Species</u>	<u>% of Cover</u>	<u>Average Density</u>	<u>Average Utilz.</u>	<u>Utilz. Factor</u>	<u>% in Game Diet</u>
Snowberry	71.9	19.7	7.2	141.8	46.2
Douglas fir	6.9	1.9	26.6	50.5	16.5
Serviceberry	5.2	1.4	29.8	41.7	13.6
Spirea	8.8	2.4	6.7	16.1	5.2
Nannyberry	1.8	.5	17.0	8.5	2.8
Dwarf juniper	2.9	.8	23.9	19.1	6.2
Rose	.7	.2	.6	.1	.0
Others (y. pine, 1.8 ribes, maple)	1.8	.5	57.8	28.9	9.4

D. Ovando Mountain Area - Powell County, May 1955
Number of Plots - 50
Occurrence in Plots

<u>Species</u>	<u>Total Occurrences</u>	<u>Total Density</u>	<u>Total Browsing Factor</u>
Ceanothus	47	1034	810
Serviceberry	46	597	1465
Douglas fir	13	42	50
Mt. maple	25	100	1165
Ash	5	36	175
Rose	5	8	8
Snowberry	10	58	25
Chokecherry	22	87	400
Willow	2	9	75
Pincherry	2	9	30

<u>Species</u>	<u>% of Cover</u>	<u>Average Density</u>	<u>Average Utilz.</u>	<u>Utilz. Factor</u>	<u>% in Game Diet</u>
Ceanothus	52.3	20.7	17.2	356.0	39.5
Serviceberry	30.2	11.9	31.8	378.5	42.1
Douglas fir	2.0	.8	3.8	3.05	.03
Mt. maple	5.1	2.0	46.6	93.3	10.4
Ash	1.8	.7	35.0	24.5	2.7
Rose	.6	.2	1.6	.32	.01
Snowberry	3.0	1.2	2.5	3.0	.03
Chokecherry	4.3	1.7	18.2	30.9	3.4
Willow	.6	.2	37.5	7.5	.08
Pincherry	.6	.2	15.0	3.0	.03

Based on this data, serviceberry and Ceanothus provided 81.6 per cent of the browse portion of the game diet in this area during the winter of 1954-55. On the basis of the above limited survey it appears the utilization of key browse species was approximately proper during the past relatively mild winter. The utilization of less than 50 per cent of these preferred browse species is indicative of proper browse use.

These data are condensed and a comparison with data obtained on seven of the key species checked in this area in 1954 is shown in Table 1.

TABLE 1

BROWSE UTILIZATION IN THE BOWSER LAKE AREA IN 1954 AND 1955
NUMBER OF PLOTS (1954 - 358) (1955 - 210)

<u>Species</u>	<u>% of Cover</u>		<u>Average Density</u>		<u>Average Utilz.</u>		<u>Utilz. Factor</u>		<u>% in Deer Diet</u>	
	1954	1955	1954	1955	1954	1955	1954	1955	1954	1955
Snowberry	48.0	79.2	22.7	17.9	5.9	5.8	133.9	103.8	15.5	49.3
Douglas fir	39.9	11.5	18.8	2.6	26.1	20.1	490.7	52.3	56.9	24.8
Mt. maple	3.5	.9	1.6	0.2	81.9	50.6	131.0	12.0	15.2	5.7
Nannyberry	4.5	1.7	2.1	0.4	22.9	16.5	48.1	6.6	5.5	3.1
Serviceberry	1.1	3.1	0.5	0.7	87.3	30.3	43.6	21.2	5.1	10.1
Rose	1.1	.9	0.5	0.2	18.0	6.3	9.0	1.3	1.1	0.6
Dwarf juniper	1.9	2.7	0.9	0.6	7.4	22.3	6.7	13.4	0.7	6.4

The utilization of browse species checked was lighter during the winter of 1954-55 than during the winter of 1953-54 based on this data with the exception of dwarf juniper which showed more use in 1954-55. Mt. maple and serviceberry received the highest degree of use each year, indicating their preferred status.

The average density of browse plants was observed to be significantly small by the 1955 check than the 1954 check. It is probable that the browse plant density of the area did not change as indicated. The difference in density is probably due to variation in the judgment of the different individuals doing the survey each year. Also differences in the immediate plot sites selected, which due to the limited status of the survey, may have failed to give a satisfactory sample of this somewhat heterogeneous area one or both years.

The use of snowberry and nannyberry, considered to be inferior browse, suggests that this range is not in good condition. White-tailed deer are common in the area.

DISCUSSION AND RECOMMENDATIONS:

The Bowser Lake area has a relatively light density of the better browse species present. Douglas fir, which is considered a fair deer food, is probably the "main course" of the deer's diet during the winter when snow makes low browse unavailable.

Based on the observed use of several browse species considered inferior for the deer forage and low density of the better browse species in the Bowser Lake Range, it is recommended that the deer population using this range be substantially reduced in number. Prolonged overuse of the browse in the area will tend to eliminate the better browse species and under such circumstances the deer herds in the area are in danger of considerable winter mortality due to malnutrition in case of severe winter.

Due to the heterogeneous nature of most of the range areas in western Montana, care should be taken in selecting sites to use the Aldous method with a thought toward adequate sampling of the various sub-types. This is especially true if the method is applied to obtaining information to be used for yearly comparison of browse conditions. It is suggested that the same individual do the field work each year to standardize ocular evaluation criteria and selection of sites.

The utilization of browse on Ovando Mountain appeared to be approximately proper during the past, relatively mild winter. However, since the range shows evidence of past over-utilization and considering the lesser availability of forage during a normal or severe winter, it is recommended a full harvest and preferably some reduction in present elk and deer numbers be accomplished.

SUMMARY:

The Aldous method of an ocular browse survey was conducted in the Bowser Lake Range in western Flathead County and on Ovando Mountain in Powell County. Results indicated the Bowser Lake Range had only a very low density of the better browse species and the deer population is being forced to use some of the poorer browse species.

Results on Ovando Mountain indicated an approximately proper utilization of key browse species during a relatively mild winter.

It is recommended that the winter deer population in the Bowser Lake Range be reduced and that elk and deer numbers in the Ovando Mountain areas receive at least a full harvest and some reduction would be desirable.

Submitted by:

Name Fred Hartkorn

Title Biologist

Approved by:

Name Merle Rognrud

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana		
PROJECT NO.	W-60-R-2		
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Title of Project: Western Montana Big Game Surveys

Leader: Merle Rognrud

Job Completion Report

Job No. II-B

Investigations Project

Title of Job: General Range Inspections

ABSTRACT

Several general range inspections were made in Western Montana. The drainage headwaters inspected were summer ranges for elk, mule deer, white-tailed deer, moose and mountain goats. The ranges were timbered except for burned areas and some sub-alpine vegetative types. The headwaters of the watersheds frequently afforded a good hunting opportunity due to the burned or open type of country and accessibility to roads.

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PROJECT NO.	W-60-R-2
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Title of Project: Western Montana Big Game Surveys

Leader: Merle Rognrud

Job Completion Report Job No. II-B Investigations Project

Title of Job: General Range Inspections

OBJECTIVES:

To gain familiarity with local and western Montana range problems and develop a coordinated program of range studies in conjunction with the state range technician and other interested agencies and organizations.

INTRODUCTION:

Information is needed on the status of big game seasonal ranges in western Montana. The winter range area has been described for many of the big game herds but only a limited amount of work has been done to learn the conditions and use of forage on the ranges. Much of the work that was accomplished is now out-dated and may not represent the range condition.

The expanse of seasonal ranges in western Montana presents a problem in obtaining a sufficient amount of satisfactory range information. It was felt that familiarity with the ranges would be an aid in developing a plan to conduct range surveys and obtain the necessary information in the future.

General range inspections were made to gain familiarity with the seasonal ranges of big game and to learn the problems in different sections of the western Montana region.

TECHNIQUES USED:

The general range inspections made during the project period were of an extensive nature. Inspection trips were made with the local game warden in a portion of the district. Big game problems and the general status of big game were discussed. Notes were kept on observations of big game distribution, vegetative types and forage species present, suitability of the habitat for big game and hunting and miscellaneous observations. Time was not available for a systematic coverage of the area and observations were not complete in most instances. The greatest value of the inspection trips came from gaining "on the ground" familiarity

with big game ranges in different sections of western Montana. The reports of general range inspections were prepared in narrative form.

FINDINGS:

I. Missoula County

Dates: July 13-16, 1954

Personnel: James Ford, Game Warden
Merle Rognrud, Biologist

A. Graves Creek Range

1. Route traveled: Beginning at Hayes Gulch thence along the Graves Creek Range past Blue Mountain to Graves Creek.
2. Big Game: Although deer and elk sign was seen along the entire route of travel more common sign was noted west of Blue Mountain. Elk were jumped in the head of Bear Creek and 31 head were seen in upper Graves Creek. It was reported that the Graves Creek elk wintered on lower Graves Creek and along Lolo Creek to Clarks Creek.
3. Vegetation: Much of the Graves Creek range was timbered with lodgepole pine, Douglas fir and yellow pine. Pine grass was common and some bluebunch wheatgrass occurred under the open timber stands. Beargrass was common on the open higher elevation slopes and was noted to be in bloom.
4. Habitat: Camp Creek and Graves Creek have been logged to their headwaters and other drainages north and south of the Graves Creek Range have been logged in the lower watershed. Bear Creek appeared to be good deer and elk habitat by the interspersions of timber and open areas.
5. Hunting: Graves Creek Range is readily accessible to hunters. The north exposed slopes provide good cover but sufficient open country occurs to make a fair hunting chance, particularly during the opening days of the season.

B. South Fork of Lolo Creek

1. Route traveled: South Fork of Lolo Creek trail for a distance of about eight miles and return.
2. Big Game: The South Fork of Lolo Creek is primarily elk, deer and moose summer and fall range although the lower drainage is also moose winter range. Few elk sign was seen in the lower drainage and evidence of an elk crossing at Middle Creek possibly to Johnnie Creek was noted.
3. Vegetation: The drainage was timbered with Douglas fir, lodgepole, spruce, yellow pine, cedar. Some

bluebunch wheatgrass openings occurred on the west and south exposed slopes. Serviceberry, willow, maple and some nannyberry were the principal browse understory species.

4. Habitat: The dense timber stands of the lower drainage probably are least used by big game. The headwaters were rocky, rough with slides from ridgetop to creek bottom to afford possibly better kind of summer range habitat.
5. Hunting: Hunting in the South Fork of Lolo Creek would be limited to timbered ridges and the slides and openings accessible from the creek bottom at the headwaters. The drainage has limited hunting potential due to cover, terrain and numbers of big game present.

C. Gold Creek - Rattlesnake Creek

1. Route Traveled: Gold Creek station via Gold Ridge to the headwaters of Gold Creek and Boulder Lake. Boulder lookout to the Rattlesnake headwaters via West Fork of starting point.
2. Big Game: Most of the Gold Creek watershed and the headwaters of the Rattlesnake is deer and elk summer range. White-tailed deer are most common in lower Gold Creek while mule deer and elk occur more commonly in the headwaters of the drainages.
3. Vegetation: The Gold Creek watershed is heavily timbered with lodgepole pine, Douglas fir, larch, yellow pine, spruce, grand fir and some cedar. The upper drainage is practically a lodgepole pine type with spruce in the moist sites. The Rattlesnake drainage is a more open country with rocky and broken terrain. Serviceberry, willow, maple, dwarf huckleberry were the principal browse species in Gold Creek. Menzezia was common on the north exposed slopes of upper Gold Creek. The Rattlesnake drainage had more Ceanothus in parts of the lower drainage. Pinegrass and lupine were common under the timber in lower Gold Creek. Dwarf huckleberry and beavergrass was common under lodgepole pine stands.
4. Habitat: Upper Gold Creek and Rattlesnake Creek in particular appeared to be good summer elk habitat. Gold Creek had the appearance of good white-tailed deer summer range. Mule deer are more common in Rattlesnake Creek possibly due to the more open kind of country with more recent burns.
5. Hunting: Although Gold Creek is timbered the stand is sufficiently open and with little down-timber to allow cross-country hunting. Upper Rattlesnake Creek is rougher, and rocky but a more open country to afford a fair hunting chance.

II. Mineral County

Dates: July 19-22, 1954

Personnel: Marian R. Ammerman, Game Warden
Merle Rognrud, Biologist

A. Trout Creek

1. Route Traveled: Trout Creek drainage to Hoodo Station. Thence along Montana-Idaho divide to Hart Lake and return. Hoodo Station to Illinois Peak via the Montana-Idaho divide and return via north fork of Trout Creek.
2. Big Game: The headwaters of Trout Creek are big game summer range. Elk, mule deer, white-tailed deer and moose were present in approximately the listed order of abundance. Elk and mule deer were most common in the burned-over headwaters of Trout Creek. The timbered portions of the upper watershed were inhabited by white-tailed deer. Moose were present in the swampy and spruce timbered headwaters of Trout Creek. The nature of the terrain and vegetative types indicated elk move at will between Idaho and Montana.
3. Vegetation: The Trout Creek watershed is heavily timbered except the burned-over headwaters and local timber remnants or reproduction in the burn area. Much of the burn is non-restocking. Beargrass, dwarf huckleberry, Phyllodoce, sedges are among the common ground cover plants. Alpine fir, white-bark pine, spruce, lodgepole pine and hemlock are the more common trees occurring in the headwaters. The Montana-Idaho divide in this section is burned and supports sub-alpine vegetation.
4. Habitat: The headwaters of Trout Creek have the appearance of good elk and mule deer habitat. The country is relatively open and except for local logged-in areas, should afford a considerable area of summer and fall range.
5. Hunting: Trout Creek headwaters afford a considerable area of open type hunting country. The watershed headwaters are readily accessible to hunters by the Trout Creek road into Idaho. However, the open type of country also is crossed quickly by bands of elk when disturbed by hunters. Movement of elk into Idaho as a result of hunting activity was reported.

B. Little Joe River:

1. Route Traveled: The South Fork and North Fork of the Little Joe were inspected.
2. Big Game: The Little Joe watershed is summer range for some white-tailed deer, elk, mule deer and a few

moose. A white-tailed deer was seen in the Little Joe headwaters along the Montana-Idaho divide. Elk sign was also found in the drainage headwaters.

3. Vegetation: Drainages of the Little Joe are heavily timbered or have dense reproduction. The drainage bottom has cedar, white pine, spruce, larch, grand fir, Douglas fir and lodgepole pine timber. A brushy understory of Menzezia, mountain lover, alder, maple, willow Ribes, dogwood, quaking aspen, thimbleberry was found. An east exposed slope on the lower north fork had an understory of serviceberry, maple, mock orange, willow, snowberry, alder, Menzezia, Ribes, Oregon grape, Spirea, Senecio. Browse forage was moderately abundant.
4. Habitat: The Little Joe watershed provides a forested summer range habitat for several species of big game. The drainage is in a snow-belt area and relatively rank growth of understory vegetation occurs. Limited areas of browse forage used during the winter were noted along the lower north and lower Little Joe drainage proper.
5. Hunting: Hunting is not important in the Little Joe drainage. The dense growth of vegetation, both of timber and understory brush makes an area difficult to hunt. Some deer are killed in the area but no elk have been reported harvested in the watershed to date. The area is quite accessible by road, but still has only a low hunting value due to dense vegetation.

III. Sanders County

Dates: July 25-28, 1954

Personnel: A. H. Cheney, Game Warden

Merle Rognrud, Biologist

Robert Blair, Biologist

A. Mount Silcox - Mount Headly - Cougar Peak

1. Route Traveled: Thompson Falls to Mount Silcox, thence via divide trail to Cabin Lake. Cabin Lake via divide trail to Mount Headly, Vermillion Peak and Cougar Peak to Thompson Falls.
2. Big Game: The inspected divide country is summer range of mule deer, elk and white-tailed deer. Mountain goats also occur along portions of the divide area. Goats were seen at Mount Silcox and Mount Headly.
3. Vegetation: The middle elevation slopes of Mount Silcox were vegetated with Douglas fir, yellow pine, lodgepole pine and hemlock timber. Serviceberry, chokecherry, snowberry, nine-bark, rose, maple, willow, huckleberry and nannyberry browse occurred.

The upper slopes of Mount Silcox had lodgepole pine, whitebark pine, Douglas fir, alpine fir, spruce and hemlock timber. The understory browse was predominantly dwarf huckleberry.

A basin at the headwaters of Four Lakes Creek had spruce, alpine fir, whitebark pine, hemlock, lodgepole pine timber. North exposed slopes were predominantly Menzezia and huckleberry. South exposed slopes had beargrass and dwarf huckleberry predominantly.

The inspected area was vegetated dominantly with timber stands except in burned areas.

4. Habitat: A considerable amount of summer range habitat was available for the big game species present. The basins at the headwaters of the west fork of the Thompson River and the drainages west of the divide had the appearance of suitable elk summer habitat. Burns were noted in Squaw Creek, Winniemuck Creek and the Vermillion River. A limited amount of goat habitat was present. Lower slopes of Mount Silcox and Cougar Peak had evidence of winter browsing.
5. Hunting: The headwater basin of the drainages and the burned areas in Squaw Creek, Winniemuck Creek, Deep Creek and Vermillion River would afford satisfactory elk hunting. The remainder of the area would provide forest hunting conditions.

B. White Pine - Beaver - Clear Creeks

1. Route Traveled: Traveled White Pine Creek a distance of about eight miles, traveled Big Beaver via Haines Peak to Clear Peak and Driveway Peak to Coopers Gulch on Prospect Creek.
2. Big Game: Mule deer, white-tailed deer and elk inhabit the inspected area.
3. Vegetation: Beaver Creek flats had a yellowpine, lodgepole pine and Douglas fir timber type with an understory of snowberry, serviceberry, willow, hawthorne shrubs. Some abandoned fields and lower yellow pine slopes were infested with stands of goat weed.

White Pine Creek had been burned and the lower east exposed drainage was not re-stocked. Serviceberry, willow, redstem Ceanothus, elderberry, chokecherry, maple, Ceanothus velutinus, were among the important browse species present.

Portions of Big Beaver, Little Beaver and Clear Creek drainages had been burned and had variable reproduction. Timber included Douglas fir, larch, lodgepole

pine, yellow pine, spruce, alpine fir, hemlock, white pine and whitebark pine. Shrub species noted were willow, nine-bark, ocean spray, nannyberry, huckleberry, dwarf huckleberry and Menzezia.

4. Habitat: The upper drainages were big game summer range but some resident deer also occupied the low-land Beaver Creek flats in the summer. White Pine Creek had a considerable variety and quantity of browse. The burned areas with some reproduction afforded good summer range.
5. Hunting: White Pine Creek sustains a light hunting pressure and Beaver Creek bottom lands is reported a good white-tailed deer hunting area. The headwaters of Clear Creek, Beaver Creek, portions of Little Beaver Creek and Lower White Pine Creek afford relatively open hunting conditions.

IV. Beaverhead County

Dates: August 10-13, 1954

Personnel: W. Schultz, Game Warden
C. Howard, Warden Supervisor
Merle Rognrud, Biologist

A. Continental Divide - Hogan, Bender, Mystic Lake Stations

1. Route Traveled: Hogan Station along the Continental Divide to Bender Station and to Mystic Lake Station.
2. Big Game: Elk, mule deer, moose and mountain goats are found in the inspected area.
3. Vegetation: The Continental Divide area is predominantly a lodgepole pine and local spruce forest with non-restocking burned areas. Dwarf huckleberry and beargrass are the dominant vegetation under the trees. Whitebark pine, alpine fir, Douglas fir also are found locally in the area. Mountain meadows and moist areas had grasses and sedge vegetation.
4. Habitat: The inspected area provides a forested summer range for big game species present. The headwaters of Johnson Creek and Bender Creek have a rocky open park and meadow type of country suitable for elk summer range. Hellroaring Creek headwaters also was found to be an open type country.
5. Hunting: The headwaters of Johnson Creek, Bender Creek and Musigbrod Creek have an open type of country for hunting. Much of the Continental Divide area is heavily timbered with lodgepole pine to make a less desirable type of elk hunting country. The area is most accessible from the Big Hole River side of the Continental Divide.

SUMMARY:

Several general range inspections were made in western Montana during the project period.

The Graves Creek Range is a forested summer range occupied by elk, mule deer and white-tailed deer. The area is readily accessible to hunters.

Limited big game range and hunting opportunity is afforded by the heavily timbered South Fork of Lolo Creek.

Gold Creek and Rattlesnake Creek areas are summer range of elk, mule deer and white-tailed deer. Limited numbers of these big game are distributed over a considerable area. Gold Creek affords forest hunting while the Rattlesnake headwaters is a more open type of hunting country.

Trout Creek headwaters is burned-over to afford good elk hunting early in the season. The Little Joe is heavily timbered and unimportant for big game hunting.

The divide country between Mount Silcox and Cougar Peak in Sanders County is forested except for burned areas. Moderate numbers of elk and deer occur in the area to afford hunting.

White Pine Creek is forested and unimportant for big game hunting. Big Beaver, Little Beaver and Clear Creeks are forested except for burned areas and provide more big game hunting opportunity.

The Continental Divide between Haugen and Mystic Lake is prominently elk summer range. The area affords considerable hunting opportunity and is most accessible from the Big Hole River.

Submitted by:

Name Merle Rognrud

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-60-R-2
DATE	July 15, 1955
VOL.	VI NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report

Job No. III-A

Investigations Project

Title of Job: A Study of Big Game and Land Management in the Bitterroot Unit

ABSTRACT

A study of big game and land use in the Sula Unit was undertaken two years ago. The utilization of the grassland portions of the area by livestock in the summer and game during the winter and spring has resulted in poor range conditions. Range transects have been established to determine the trend in range condition, studies employing a series of temporary and permanent enclosures designed to appraise the effects of livestock and game use have been established, and pellet group plots have been used to determine the trend in game utilization of the range. Browse studies have indicated overuse of the limited browse supply on the winter range areas. Studies on survival of conifer seedlings have shown that the degree of conifer utilization by big game is directly correlated with survival of conifer reproduction. Livestock grazing pressure has been reduced approximately 20 per cent since 1953. It is recommended a reduction in elk and a full harvest of mule deer be made to bring game numbers within the limits of their forage supply.

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INTRODUCTION:

The conflicting demands for use of limited land resources in the Bitterroot area were recently focused in the Sula Unit. Multiple land uses in this Unit include timber production, livestock production, wildlife, recreation and watershed management. A land resource plan, recognizing the concept of multiple land use, was prepared as an approach to the problem (Hamre and Watt 1953).

This land resource plan is concerned with the use, protection, and development of wildlife habitat harmoniously with other land uses. The production of maximum sustained yields of fish and game for recreational use, within the limits of land and water capabilities and economics of the resources of the Sula Unit, is the goal of this plan. When the plan was activated the Montana Fish and Game Department undertook a study of the relationships of big game and other land uses involved in the Sula Unit to provide information to use as a basis for resolving some of the problems.

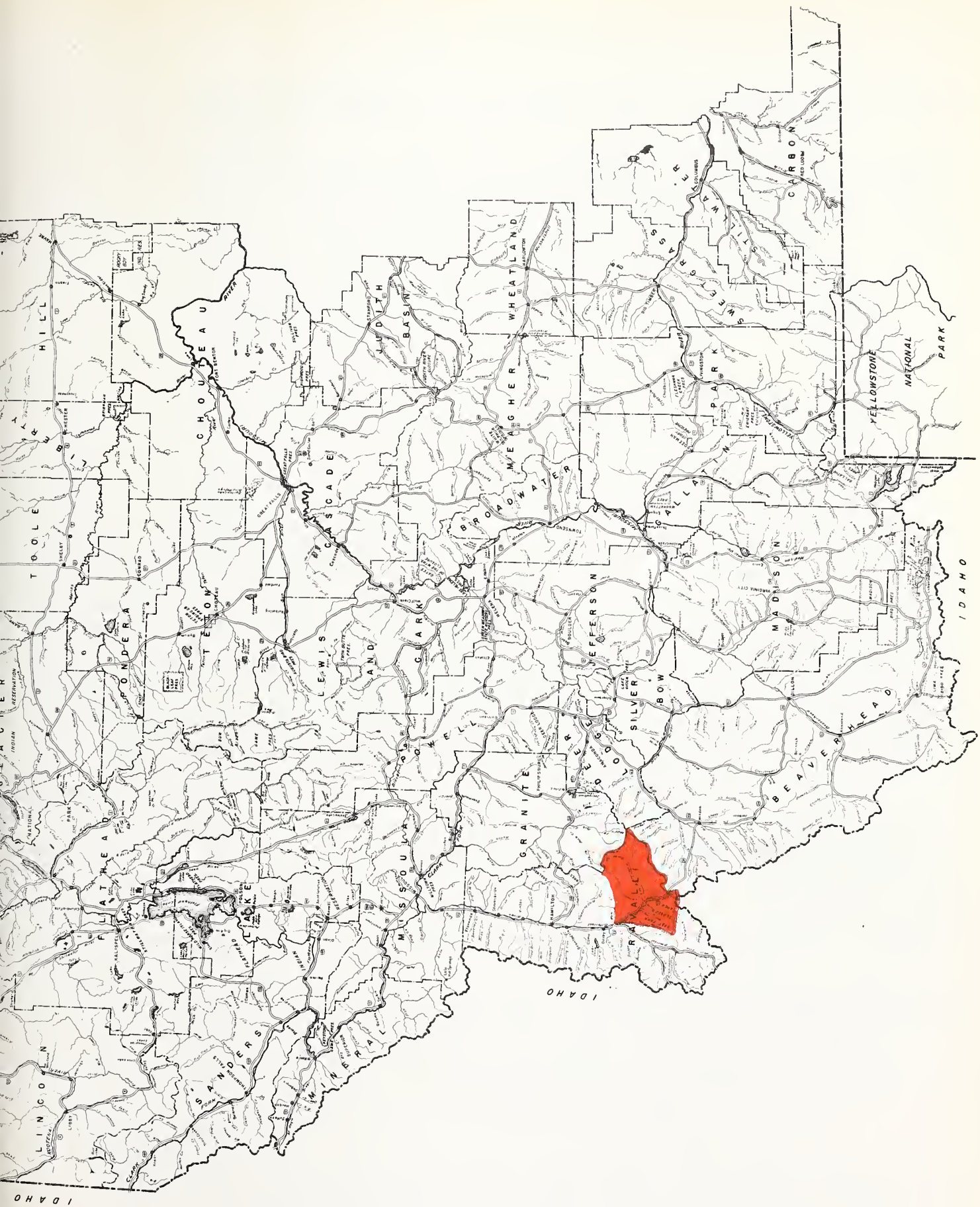
This is a progress report of these biological and land use studies covering the period May 1953 to June 1955.

OBJECTIVE:

To obtain factual information regarding the big game species and their relationships to land use in the Sula area. To provide a basis for recommending big game management in harmony with other land use interests of the East Fork area.

GENERAL DESCRIPTION OF SULA DISTRICT

The Sula District comprises most of the drainage of the East Fork of the Bitterroot River (note Map 1). It varies in elevation from 4,000 feet to 9,000 feet. The slopes are



MAP 1 - Location of Sula Unit



moderately steep. Flat or rolling lands are a small part of the total area. Soils are of granite origin, and mostly sandy.

Vegetative cover on the lower and warmer exposures is bunchgrass with an association of the xerophytic browse plants, such as bitterbrush and mountain mahogany. The bunchgrass areas merge and give way to ponderosa pine forest on more moist sites and slightly higher elevations. The ponderosa pine, in turn, gives way to the Douglas fir at about 6,000 feet on the southerly exposures. Lodgepole pine replaces the fir on the moist slopes and almost all areas above 7,000 feet. The sub-alpine type is predominant above 8,000 feet.

The gross acreage of the district is 257,942 acres. This acreage is comprised of 231,442 acres of National Forest land, 13,600 acres of State land and 12,840 acres of private land.

Precipitation varies widely over the district. The lower areas receive only about 14 inches per year, while the higher ridges receive up to 40 inches. Most of this precipitation is in the winter in the form of snow.

Sula is the only community on the district and is made up of about 90 people. The community is to a high degree dependent upon cattle for their livelihood. Some of the people are engaged in the timber industry of the area on a full or part time basis. Hay is the only agricultural crop raised within the district. The climate is too cold to permit other agriculture. The area was settled in about 1895, and most of the ranches are now run by the second and third generations of those settlers.

About one-fifth of the district is in the ponderosa pine type, and one-fifth in the Douglas fir type. Logging has been going on for about ten years on National Forest lands. The district can support an annual cut of about 5,000 M feet of sawlogs. About half of the district is in the lodgepole pine type where there has been only small commercial cutting operations to date.

The district is a favored recreation spot for people in the Bitterroot Valley and Missoula. Highway No. 93, running through the district, brings many out-of-state tourists into the area. Two developed hot springs with swimming pools; three Forest Service developed campgrounds; and one ski course with three tows, are available to recreationists visiting the district. Fishing and hunting attract many more people.

Water is also an important resource from the forest. Irrigation water for ranches in the Sula area comes from the East Fork of the Bitterroot and its tributaries. This water is also used at present and will be used more in the future for irrigation farther down the Bitterroot Valley and Columbia River Drainage.

There is an abundance of fish and game on the district. The East Fork of the Bitterroot has been an excellent producer of fish and has held up amazingly well under the fishing pressure it receives. Mule deer and elk are common. There are some moose, white-tailed deer, and mountain goats on the district.

HISTORY AND TRENDS OF LIVESTOCK GRAZING

Livestock grazing began with the coming of the homesteaders in the period 1885 to 1895. Stock from ranches in the lower Bitterroot as well as local ranches were put out in large numbers. One ranch was reported to have grazed 3,000 cattle on only one portion of the Unit. Horses used some of the grass-land areas yearlong. Periodic figures on livestock using the Sula Ranger District are shown in Table 1. The area used by cattle at present is shown in Map 2.

TABLE 1

LIVESTOCK GRAZING ON SULA RANGER DISTRICT

Year	Cattle & Horses	Sheep
1935	1,758	3,100
1940	1,480	1,452
1945	1,690	1,100
1950	1,680	0
1952	1,623	0
1953	1,840	0
1954	1,734	0
1955	1,682	0

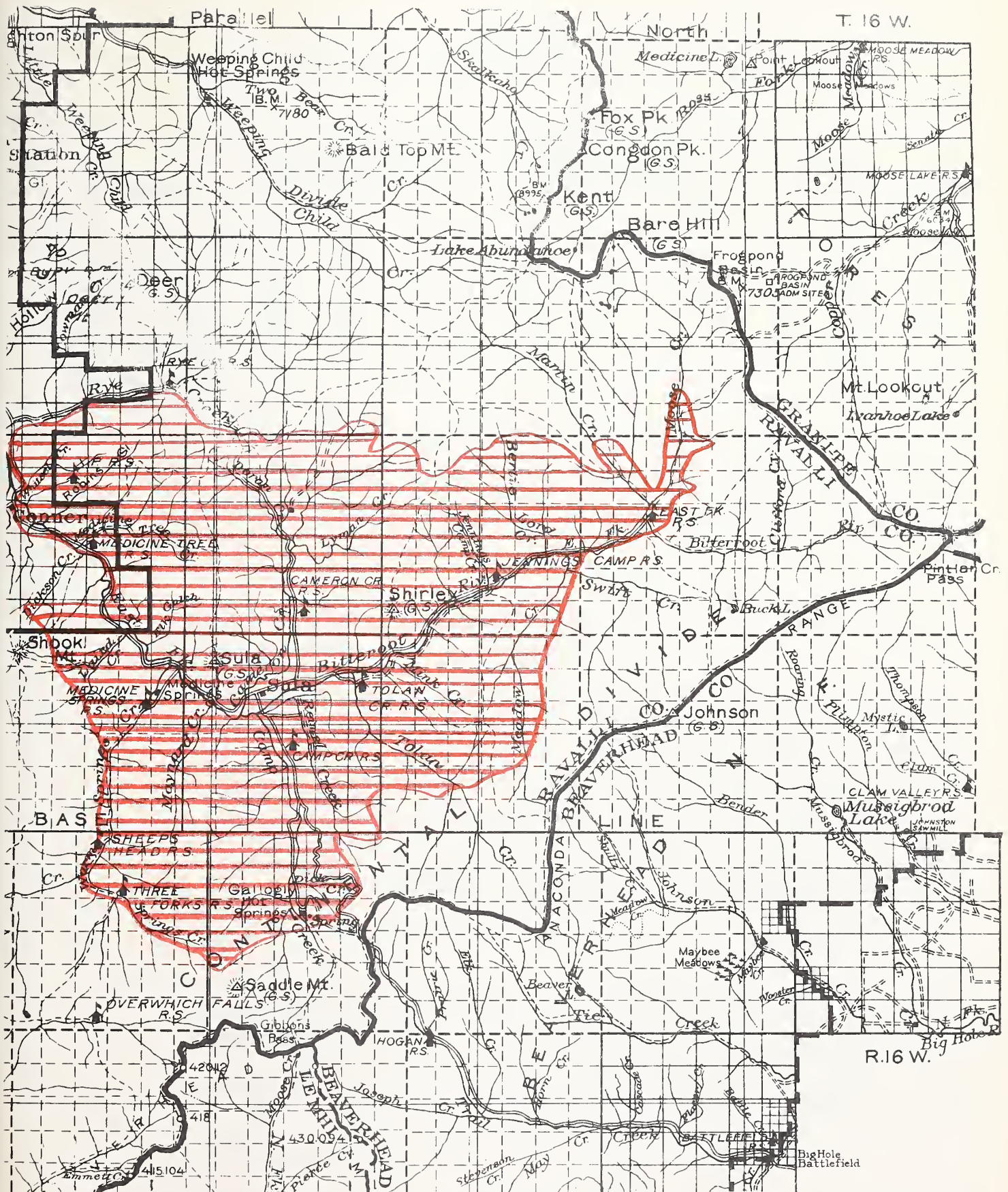
While sheep decreased and were not present by 1950, cattle and horse grazing reached a high for the years considered in 1953.

A breakdown of cattle and horse numbers by allotment and land ownership is shown for 1953, 1954 and 1955, in Table 2.

Based on the observation of poor range conditions and over-utilized areas in the fall of 1953 the Forest Service recommended reduction in livestock grazing pressure in 1954.

Accordingly, fewer cattle and horses were permitted in 1954 and the grazing season was shortened by 15 days in the spring and 30 days in the fall. These changes reduced the livestock grazing pressure by approximately 20 per cent in 1954 compared to 1953. Further reduction in cattle numbers is planned for 1955.

EAST FORK OF BITTERROOT AREA



MAP 2 - Area Grazed by Cattle During Summer in Sula Unit


 Grazed by cattle

TABLE 2

NUMBER OF CATTLE AND HORSES ON PERMIT IN SULA RANGER DISTRICT

Allotment	National Forest			State Leased and Private			Total		
	1953	1954*	1955* ¹	1953	1954*	1955* ¹	1953	1954*	1955* ¹
Medicine Tree	301	301	301	68	68	92	369	369	393
East Fork	518	465	425	60	36	66	578	501	491
Camp-Reimel	201	193	193	99	103	103	300	296	296
Meadow-Tolan	196	203	200	2	2	2	187	205	202
Warm-Springs	231	198	198	62	68	5	293	266	203
Moose-Martin	30	30	30				30	30	30
Dickson-Blind Draw				72	67	67	72	67	67
TOTAL	1477	1390	1347	363	344	335	1840	1734	1712

* No horses

¹ Tentative Figures

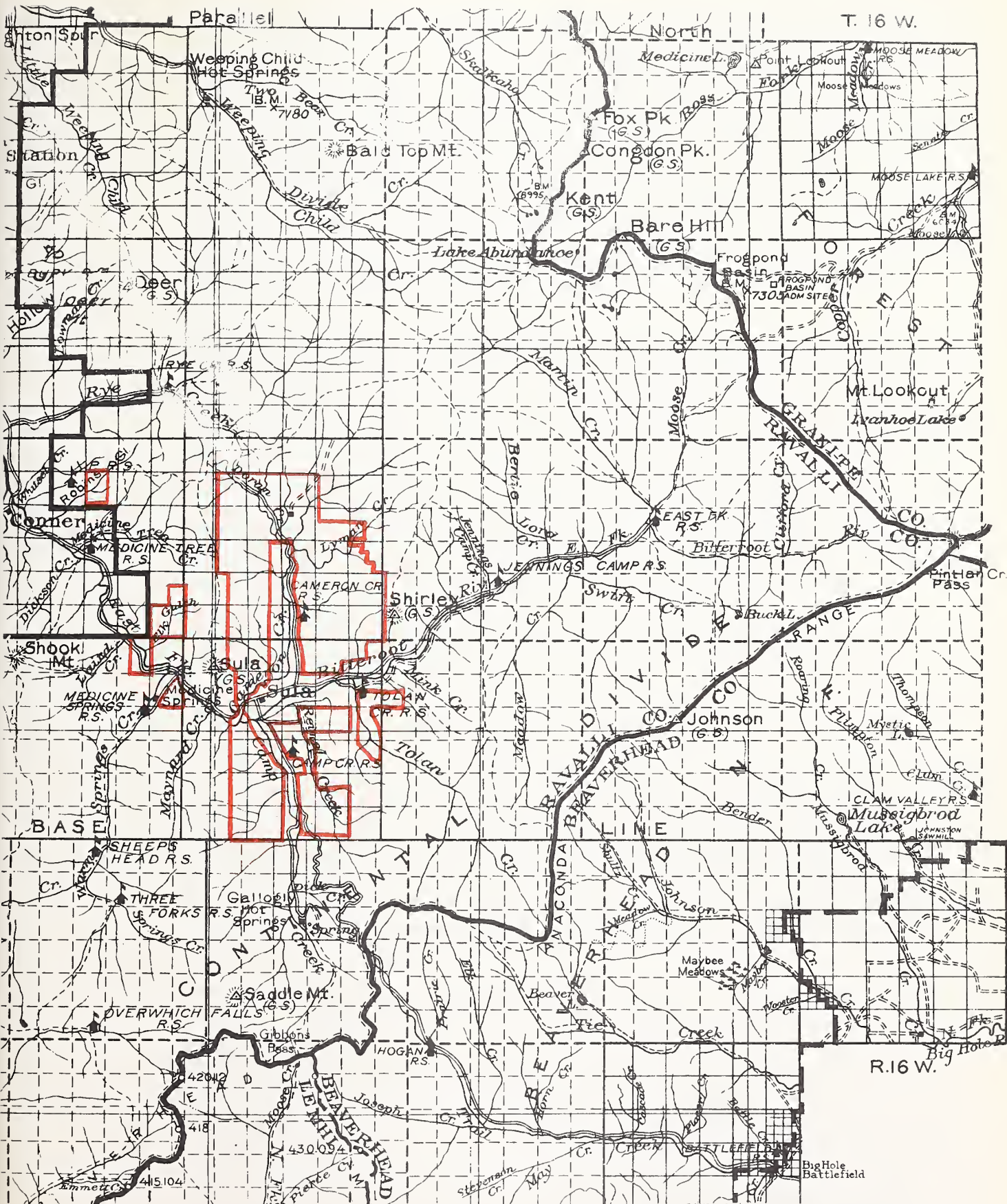
Future trend in livestock numbers grazed on the open range will depend mainly upon range trends.

To date reductions in range use have not caused reductions in cattle on the local ranches. Private fenced range-pasture land has been used to pasture cows not permitted. Nearly all of the local ranchers are carrying out land improvement projects on their lands which they hope will make it possible for them to keep more animals on a pasture status if further reductions in grazing pressure on the range is necessary. The Forest Service has advised the ranchers concerned that the trend in range use will probably be toward the lessening of use whenever possible during the next few years to permit the full recovery of the range.

Due to lighter open range use, the use of private pasture lands is being intensified with more objection to big game use of these pastures being expressed. Quite a number of ranchers express the idea that as long as they can use public lands in the summer they will not object to moderate game use on their lands in the winter; but if they cannot use the public lands for summer livestock grazing they cannot tolerate game on their private pastures in the winter.

Approximately 22,000 acres of private and state owned lands are used by big game in the winter. Private lands that are used by big game are shown in Map 3. Portions of these lands are not fenced and make up part of the open range. On the fenced

EAST FORK OF BITTERROOT AREA



MAP 3 - Private Land Used By Big Game in Sula Unit

Private land used by big game (approximate).

portions of these lands more direct competition between game and livestock occurs. These fenced grassland pastures are used by most of the ranchers as spring - fall pasture. A few ranchers leave considerable grass in the fall for use with green grass in the spring. These deferred use pastures are very attractive to the game and frequently concentrated game use occurs in them. The combined cattle-game use in some cases is too much and overgrazed conditions are resulting in these pastures. The psychological effect of ranchers pitching hay to their cattle and looking up at elk and deer concentrated on the first patches of green grass in their pastures each spring is conducive toward an attitude of favoring big game reductions.

The ranchers of the Sula area have reported some damage by elk raids on haystacks (Longworth 1937 and McDowell 1949). Most of the ranchers in the Sula area fence their stacks elk-proof in the summer. They report that a far lighter type fence is needed if the elk never get into a stack than if they once start and have to be stopped. In most cases the elk-proof aspect of the stock fences are merely a course of light woven wire on top the regular cattle fence. Some use of haystacks by elk occurred during the winter of 1954-55 mostly on the William Wetzsteon ranch. The principle offenders were a group of mature bulls which persisted in tearing down the fences.

Mule deer make raids on unfenced alfalfa stacks on the west side of the Sula Basin.

BIG GAME POPULATION TRENDS

In the opinion of the first homesteader in the Sula Unit, there were approximately the same number of elk but less mule deer when he arrived in 1885 as there is at present. However, he recalls that most of the elk were killed by 1905 during the influx of homesteaders who took them yearlong. There were very few elk until 1922-25 when populations began to build up during years of conservative hunting regulations. Periodic elk and deer population estimates are shown in Table 3.

The 1922 count was included as a basis for early big game numbers. The 1937 estimate was based upon a very extensive coverage of the area by E. R. A. study crews (Longworth 1937). The 1942 estimate was based upon a winter study conducted by Mr. George Hollibaugh and assistants. The 1946 and 1947 estimates were based upon a brief coverage of the winter range area (Thompson 1946-47). It is believed that the 1946 estimate may have tended to be excessive and the 1947 estimate to be low. The 1953, 1954 and 1955 estimates were based on aerial elk censuses and general observations each year and are probably conservative.

TABLE 3

ELK AND DEER POPULATION ESTIMATES IN THE EAST FORK UNIT

Year	Agency	Elk	Mule	Basis for Estimate
			Deer	
1922	Forest	175	300	General observations.
1937	Service	521	781	E. R. A. Game Study.
1942	Fish and	850	1700	Winter game study.
1946	Game Dept.	1200	3000	Brief ground survey.
1947	"	500	1200	" " "
1953	"	450	1800	Aerial elk count. General observations.
1954	"	650	1200	" " " " "
1955	"	800	1200	" " " " "

Accurate census methods for mule deer in mountainous terrain such as the Sula Unit are not known. General field observations, especially counts from the roads at "green up" time, tend to indicate that the mule deer population was lower in 1954 than it had been in 1953, but higher in 1955 than in 1954. The opinion of residents of the Sula area is that there were more deer from 1940 to 1949 than there has been since 1949. Local residents and Forest Service employees reported severe winter kill of deer during the winter of 1948-49 and 1949-50.

Aerial censuses of the elk in the Sula Unit have been made during the winters of 1953, 1954 and 1955. In 1953, 366 elk were counted, in 1954, 524 elk were counted, and in 1955, 677 elk were counted. These counts suggest that the elk population has increased each year. However, it must be recognized that better counts were probably obtained each year due to availability of better aircraft and intensified effort. Elk numbers by portion of the Sula Unit are shown in Table 4.

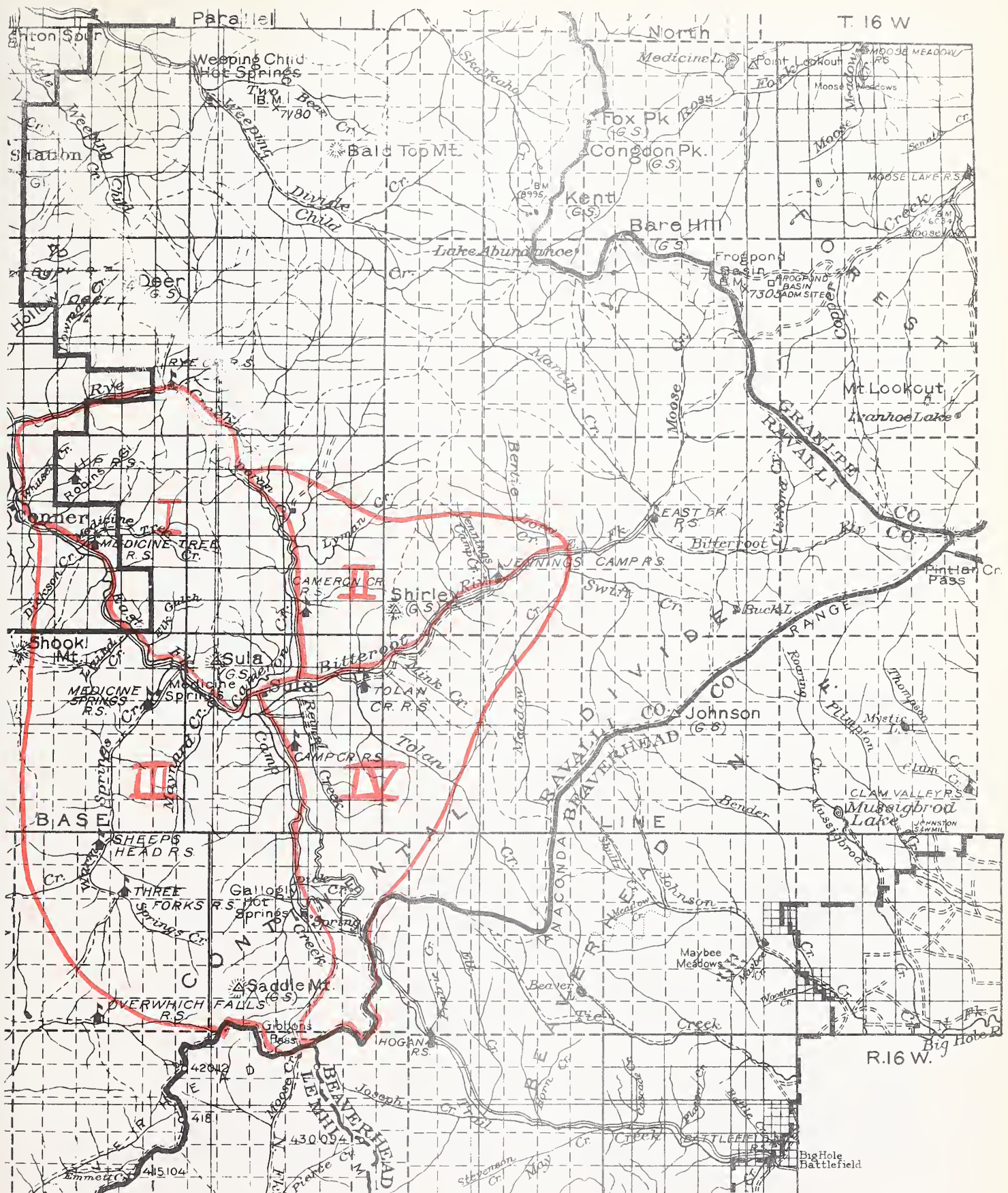
TABLE 4

SULA UNIT AERIAL ELK COUNTS

Area *	1953	1954	1955
1. Sula Peak-Medicine Tree	13	34	99
2. East Fork	266	334	309
3. Warm Springs-Maynard	0	24	96
4. Camp-Reimel-Tolan	87	132	173
TOTAL	366	524	677

* Note Map 4

EAST FORK OF BITTERROOT AREA



MAP 4: AERIAL ELK CENSUS SUB-DIVISIONS

- I. Sula Peak-Medicine Tree Winter Range Area
- II. East Fork Winter Range Area
- III. Warm Springs-Maynard Winter Range Area
- IV. Camp-Reimel-Tolan Winter Range Area

MIGRATION AND DISTRIBUTION STUDIES

"Where were they during the hunting season?" This is a common question in the minds of game managers and sportsmen alike when they see elk and deer concentrated on the winter range. In many cases liberal hunting on the winter range does not harvest the population as the animals are in some other area at the time of the season. Thus, if proper management is to be practiced, it is necessary that migration and distribution information be obtained for important big game herds.

Relatively few elk and deer are observed on the East Fork area during the summer and early fall. This suggests that probably rather large numbers of both species drift over into the adjoining Beaverhead River and Rock Creek drainages in the summer. Past reports (Hollibaugh 1942 and Longworth 1937) mention such a seasonal distribution.

In an effort to obtain positive information on this distribution pattern, elk and deer have been trapped, tagged and released during the winters of 1953-54 and 1954-55. Their distribution during the hunting season can be determined by reports of hunters shooting these tagged animals. Possible changes in use of winter ranges could be detected by future trapping on the different portions of the winter range (note Map 5).

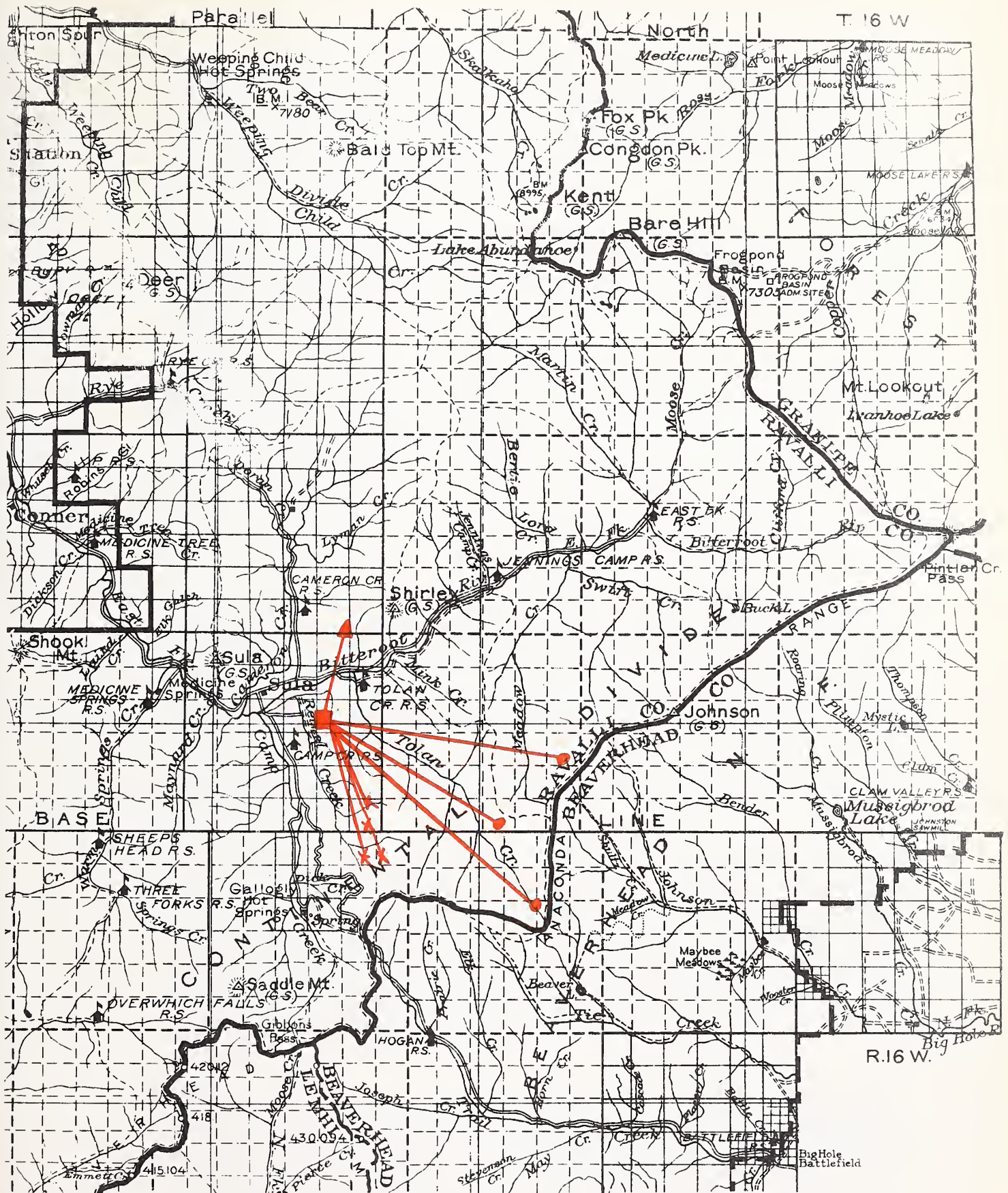
Sixty-two elk and four mule deer have been caught and tagged at the trap located south of the East Fork River and east of Camp Creek (33 elk and 3 deer during the winter of 1953-54.) Three bull elk were tagged at a trap located north of the East Fork River during the winter of 1954-1955. Some tagged elk and deer were recaptured each year. Twenty-seven per cent of the elk tagged in 1953-54 were recaptured at the same trap in 1954-55.

The three elk reported killed by hunters were taken within ten miles airline of the trapping site in the upper aspects of the drainages of the two creeks to the east of the trap.(note Map 5). The fact that two of these elk were taken by hunters camped on the Beaverhead side of the divide suggests that a significant number of elk are killed on the East Fork drainage each year by hunters from the Beaverhead.

One tagged spike bull (tagged as a calf in January 1954 at the trap south of the East Fork) was trapped north of the East Fork road in February 1955. This indicates that some interchange of elk between elk on different portions of the winter range occurs.

Seasonal big game distribution has been checked by periodic ground and aerial observations of the area.

Based on two years observations it appears that: 1) most of the big game spend the period from July 15 to December 1 at the higher elevations of the East Fork along the Beaverhead and Rock



- Reimel ridge elk trap
- Locations of tagged elk kills during 1954 season
- ▲ Location of Bunch Gulch elk trap where one tagged elk was caught in Feb. 1955
- X Location of tagged elk observed in May 1955

MAP 5: LOCATION OF ELK TRAPS, REPORTED TAGGED ELK KILLS AND SIGHT OBSERVATIONS OF TAGGED ELK

Creek divides - the summer range, 2) most of the elk and deer spend the period from December 1 to January 15 and May 15 to July 15 in the timbered areas of intermediate elevation - the spring-fall range, and 3) most of the big game spend the period from January 15 to May 15 on the semi-open grassland or foothill areas - the winter range.

Movements appear to be affected by weather and hunting to a high degree. The falls of 1953 and 1954 were very mild. Winter conditions began in mid-December 1953 and lasted until mid-February. Winter conditions were not very severe until late February in 1955.

Some elk and quite large numbers of mule deer are present on the lower and intermediate ranges during the summer and fall periods. These are to some degree pushed back by hunting in the fall.

Approximate winter, intermediate and summer range areas are shown in Map 6.

RANGE STUDIES

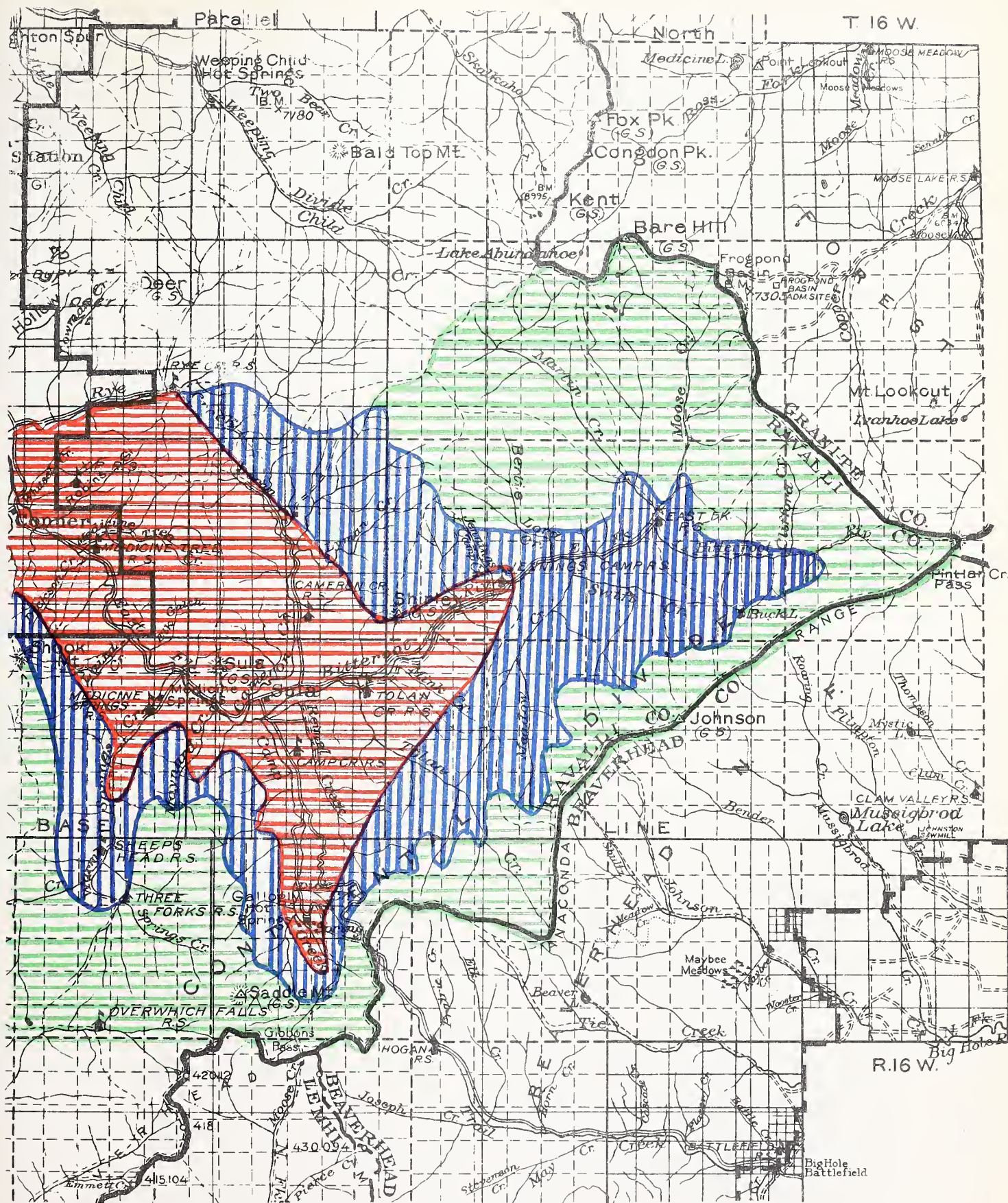
Description of Forage Producing Areas: The grassland areas of the Unit are considered only fair as forage producing lands. Grass producing sites are characterized by rather steep south facing slopes. The soils, which are of loose granitic type, are subject to early and long periods of summer soil drought. Spring and early summer trampling by cattle and game is a very important factor in losing grass cover on these loose soils. Consequently these grassland areas cannot withstand heavy grazing pressure.

The ponderosa pine-Douglas fir areas generally have a relatively poor quality of grass and browse species present. The dominant grass species is pine grass (Calamagrostis) which has a relatively low-palatability for cattle or game. Most of the browse species associated with this type - snowberry, spirea and nine-bark - have a low preference value for game. A very light density of serviceberry makes up the palatable browse supply. Some palatable grasses are found on the open parks in this association.

The browse-grassland type areas have very high quality forage, but are limited in extent. Limited bitterbrush and mountain mahogany stands occur in the Sula area and are highly palatable to elk and especially deer. The sites where this vegetative association occurs are mostly very steep and dry. Due to the low soil moisture usually available to browse plants on these sites they cannot withstand sustained heavy grazing.

The lodgepole pine dominate areas have very little ground forage of value. Beargrass and low huckleberry are present, but

EAST FORK OF BITTERROOT AREA



MAP 6: SEASONAL GAME RANGES OF SULA UNIT



Winter Range Area



Spring-Fall Range Area



Summer Range Area

do not seem to be used to any significant degree by either game or livestock. However, the huckleberry may be an important item in the game summer diet. Some isolated openings occur in this type and are used by game in the summer and fall. This zone has in recent years become very difficult for game, stock or man to travel due to heavy downfall of bug-killed trees. One effect of this excessive downfall is to reduce the useable grazing areas and protect big game during the hunting seasons.

The sub-alpine areas are dominated by beargrass but some meadow grasses and sedges used by game and livestock are present. Domestic sheep were grazed on these areas extensively before economic factors eliminated the sheep in the Bitterroot. These areas provide an excellent forage supply for game from late July to early December, but snow restricts the season of use.

Seasonal Range Inspections: In an effort to determine in a rapid manner, the range and soil conditions and degree of current utilization of the area the various range allotments were covered by horseback in September 1953. Representatives from the sportsmen, ranchers, Forest Service and Montana Fish and Game Department were present on each trip to obtain unity of thinking and agreement regarding the condition of the various areas. Range condition, soil condition and degree of current utilization based on ocular appraisal were recorded on a base grazing map at approximately half hour intervals.(note Map 7). The livestock period of use was about complete for the year at the time inspections were made.

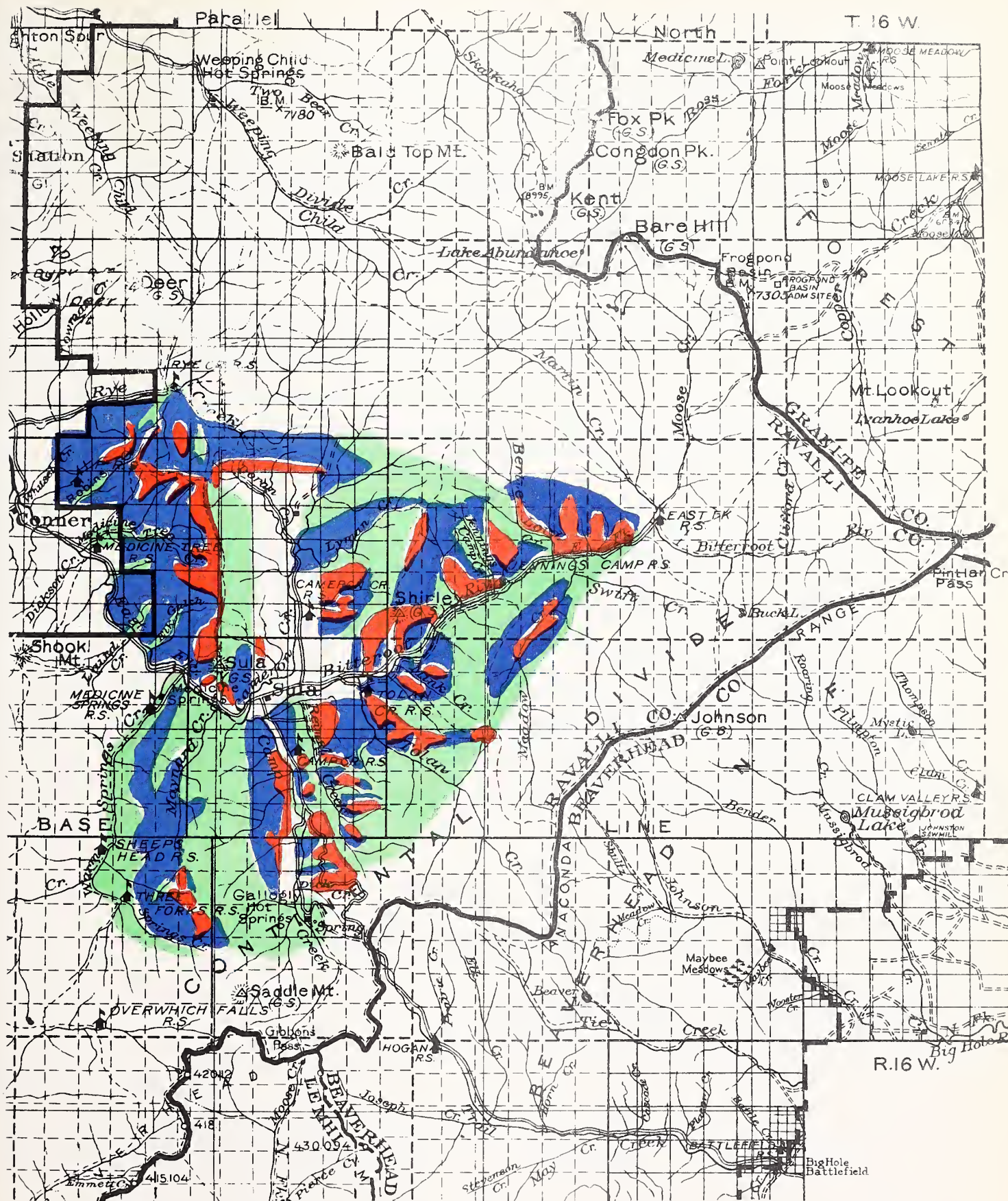
In general the timbered portions of the area were considered to be in fair to good condition with current under or proper utilization. This was especially true of north and east exposures.

With the exception of only minor areas the south and west exposed open bunchgrass areas were considered to be in poor or fair condition with current overgrazing frequently noted. Range vegetative conditions were usually poorest on such areas that were easily accessible and only moderately steep. Soil conditions were usually poorest on the steeper slopes.

In early May 1954, the range units used by game animals during most of the winter were inspected by representatives from the above groups to determine the effects that the game may have had on these ranges. It was found that considerably less forage was present than in the fall and some sites where the use had been considered proper in the fall were now over-utilized. Big game use seemed to have been heaviest on the south and west faces of the bald hill areas which wind action had tended to keep bare most of the winter.

The lower allotments (principle game winter ranges) were again inspected in October 1954. No change in range or soil conditions was evident but most of the allotments appeared to have

EAST FORK OF BITTERROOT AREA



MAP 7: SULA UNIT RANGE CONDITION SURVEY 1953

■ Poor
 ■ Fair
 ■ Good

been less heavily grazed than during the 1953 season. Current utilization was considered to be proper (with the exception of preferred areas in very poor condition which were over-utilized).

Two of the important game winter range units were inspected by Montana Fish and Game Department and Forest Service personnel in early May 1955. Most of the south and west exposures were found to be over-utilized with use of green forage evident. Use on north and east exposures appeared to have been only moderate.

Extensive coverage of the big game summer-fall range areas during 1953 and 1954 indicated most areas were in good condition. However, over-utilization on some of the high bald hills was noted in 1954.

Sheet and gully erosion has been observed to be developing on some of the steep south and west exposed slopes where poor vegetative conditions are present. Big game is held responsible for the over-use and trampling on these sites as in most cases cattle do not use the area.

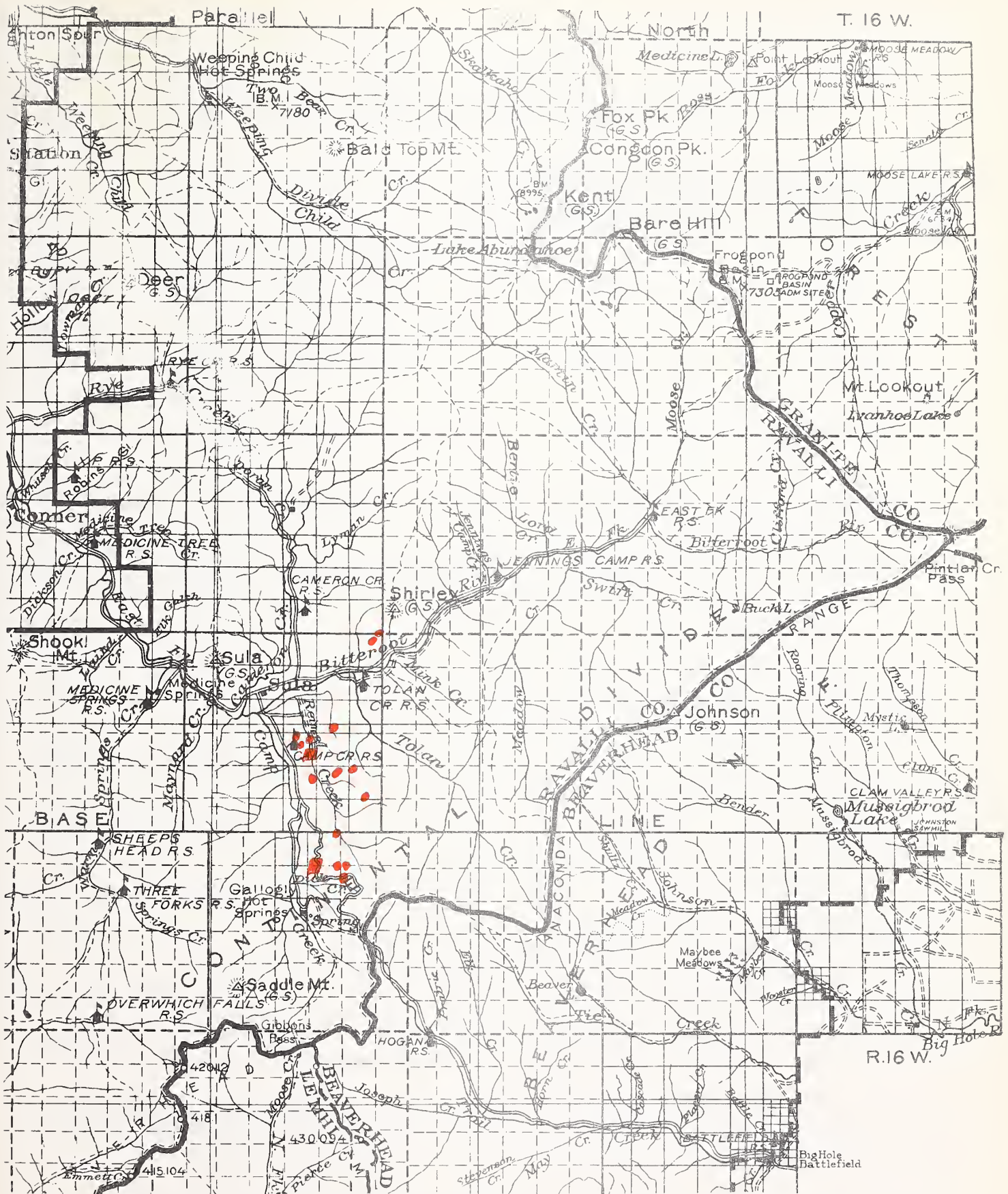
Range Condition Trend Transects: In an effort to determine the trend in range condition on the various allotments of the Sula Ranger District, standard Parker three-step method transects have been or will be established over the District. On allotments used by big game in the winter it is planned that Fish and Game Department personnel will cooperate in the establishment and future checks of these transects. During the summer of 1953 and 1954, 12 clusters of two transects each were established over the Camp-Reimel allotment and two clusters of transects were established in Bunch Gulch. Conditions found on the transect sites are shown in Table 5. Location of transects is shown on Map 8.

TABLE 5

RANGE CONDITION TRANSECTS ESTABLISHED IN 1953 AND 1954

Site	Adjective Range Condition Rating	Adjective Soil Condition Rating
<u>Eastside of Camp Creek:</u>		
Lower Portion Forest Service Horse Pasture, NW Exposure, Moderate Slope	Mid-poor	Fair
Middle Portion Forest Service Horse Pasture, SW Exposure, Moderate Slope	Mid-poor	Fair
Upper Portion Forest Service Horse Pasture Southly Exposure, Gentle Slope	Mid-poor	Fair

EAST FORK OF BITTERROOT AREA



MAP 8: LOCATION OF RANGE TRANSECTS AND GAME-CATTLE RANGE STUDY PLOTS

- Range Transects
- Game-Cattle Range Study Plots

TABLE 5 (Continued)

RANGE CONDITION TRANSECTS ESTABLISHED IN 1953 AND 1954

Site	Adjective Range Condition Rating	Adjective Range Condition Rating
Second Ridge Above Range Station Westerly Exposure, Gentle Slope	Fair	Good
Bald Hill Across From Ferguson Ranch Westerly Exposure, Gentle Slope	Poor	Good
Dick Creek Bald Hill SE Exposure, Steep Slope	Fair	Poor
Dick Creek Bald Hill SW Exposure, Moderate Slope	Poor	Fair
Dick Creek Bald Hill Southerly Exposure, Moderate Slope	Poor	Poor
<u>Eastside Reimel Creek:</u>		
Barley Ridge Ridge Top, Level	Poor	Excellent
Diggins Bald Hill Southerly, Moderate Slope	Poor	Fair
Wallace Bald Hill SW Exposure, Moderate Slope	High Poor	Good
<u>Reimel Creek Bottom:</u>		
Bottom, Level	Poor	Excellent
<u>Eastside Bunch Gulch:</u>		
Northside of First Draw Southerly Exposure, Moderate Slope	Poor	Poor
Southside of First Draw Exposure NW, Slope Steep	Fair	High Fair

A poor range condition status was found at 11 of the 14 transect cluster sites. In view of the fact that most of the transects were located on sites that were considered to be in poor condition by previous ocular evaluation this could not be considered an average of range conditions over the Sula Unit. However, it

would reflect the condition status of the more preferred range areas. Game and livestock both use 13 of the areas but probably only cattle use one of the sites (Reimel Creek bottom). None of the sites were found to be in a good or excellent condition.

Soil conditions were found to vary from excellent to poor. Only the level sites were found to be in an excellent condition. Of the three sites with gentle slopes, two rated a good soil condition and one a fair condition. Of the seven sites with a moderate slope four rated fair soil condition, two rated poor soil condition, and one rated good soil condition. Of the two sites with a steep slope one rated fair and one poor in soil condition.

These transects will be checked after three to five years to determine trend in range condition.

Cattle-Game Grassland Study: The open grasslands in the Sula Unit provide grazing for cattle during the summer and game during the winter and spring. Cattle prefer the Palouse Prairie type vegetation of these open grasslands to the pinegrass type found on the timbered north slopes and consequently graze them heavily. The deer and elk also use these open grasslands heavily, because due to exposure and wind action, these areas are relatively snow-free all winter and forage is readily available. These open south and west exposures green up relatively early in the spring and the elk and deer concentrate on them at this time.

In many places the combined grazing of cattle and game is apparently more than the grasslands can sustain. Over-grazing has brought about a serious decline in range condition on much of the open grasslands. It is necessary to know the effect cattle and big game have on these grasslands to make proper adjustments in use.

In an effort to gain this information two study areas were established. Location of study plots is shown on Map 8. On the Dick Creek Bald Hill four plots (.2 acre) with similar exposure and vegetation were established. This site was selected as it appeared to be in a transition zone; the area below was in good condition and the area above was in very poor condition. The site showed use by both big game and cattle. Its location near the Big Hole road facilitated the fencing and will make it easily accessible for checks and inspections.

The exposure is southwest and the slope is moderate. Wind action tends to sweep the snow off all plots with little tendency to drift at the fences. The plots are located in a row up and down the hill. No visible significant differences could be found between the plots except slightly more ant hills and pocket gopher activity was present on the total exclosure plot.

One plot was fenced with woven wire to a height of eight feet to keep out both game and cattle. This is a total exclosure.

Another plot will be fenced with woven wire to a height of eight feet during the winter and early spring only. This is a game exclosure.

Another plot is open to grazing by both big game and cattle. It represents the use received by the grasslands in that area. It is not fenced.

Another plot is fenced with woven and barbed wire to a height of $4\frac{1}{2}$ feet during the summer only. This is a cattle exclosure.

All the plots were sampled using the Parker three-step transect method to determine present range condition and trend in condition. Two 100 foot line transects were established in each plot. All plots rated a poor in vegetative condition and good in soil condition.

The fence was put up on the game range and total exclosures in late September 1954 after the cattle were off the range. When these plots were inspected on May 7, 1955, there was considerably more forage, both grass and forbs present in the fenced plots than the unfenced plots. This indicated that the game had taken a significant amount of forage during the winter and early spring.

The wire was removed from the game exclosure and put up on the cattle exclosure on May 24, 1955. A check of the game exclosure area on May 28, 1955, four days later, indicated recent use by both deer and elk. The use of this plot by game after the wire was removed suggested a temporary preference for the area possibly due to the greater amount of forage present. No observations regarding the cattle use were possible.

Another study was established on the steep bald hill east of the Sula Ranger Station. The Forest Service had fenced this hill and used it as a horse and mule pasture for a number of years. Even with moderate use there appeared to be a decline in range condition. This appeared to be due mainly to trampling and soil displacement from the horses and mules on the steep aspects.

In 1954 it was decided to discontinue pasturing of horses on this hill. No stock was grazed in this pasture in 1954. It is planned to give the area an indefinite rest from livestock use.

This pasture is also used as winter deer and elk range. It carries a sizeable number of elk and deer during the winter months.

In early December 1954 a game exclosure (.2 acre) was constructed on a southerly exposure in this pasture. An eight foot woven wire fence was put up.

It is planned to establish Parker transects inside the exclosure and on a near-by similar site outside the pasture in June 1955.

Thus, an area grazed by both game and cattle, an area grazed only by game, and an ungrazed area will be present. The transects established in each type area should provide an index to range condition trend in the next few years.

When an ocular inspection of the area was made in October 1954 there was noticeable more forage present in the ungrazed pasture area than was present on the adjoining grazed range. This difference was not as marked by spring after the game had used both areas.

When the exclosure area was last checked on May 7, 1955, there appeared to be more forage inside the exclosure than outside. This would indicate at least moderate utilization of forage in the pasture during the past winter game use period.

Pellet Group Plot Observations: As an index to the trend in range use by elk and deer, pellet group plots have been established on the major winter range units. In late May 1954 three 100 foot staked line transects were established on the Camp-Reimel, Sula Peak and East Fork winter range units. Fresh pellet groups within four feet on each side of the tape line were counted and the total for deer and elk recorded. These nine transects were checked again late in May 1955 and fresh pellet groups counted and recorded as above. Results of these pellet group counts are given in Table 6.

TABLE 6

SULA UNIT PELLETT GROUP COUNTS, MAY 1954 AND MAY 1955

Area	Plot Size (Square Feet)	Elk Pellet Groups		Deer Pellet Groups	
		1954	1955	1954	1955
Camp-Reimel Unit					
Dick Creek Bald Hill	800	5	11	6	3
Middle Ridge	800	4	3	9	6
F. S. Horse Pasture	800	2	3	3	6
Sula Peak Unit					
Base Sula Peak	800	0	0	7	9
Lower Spring Creek	800	0	2	13	19
Upper Spring Creek	800	0	1	7	17
East Fork Unit					
West Bunch Gulch	800	2	2	1	4
East Bunch Gulch	800	9	7	4	16
W. Wetzsteon Pasture	800	4	7	3	0
TOTAL	7,200	26	36	53	80

These counts indicate that there was approximately 3,870 more elk use and 51 per cent more deer use on these ranges during the winter of 1954-55 than there had been during the previous winter of 1953-54.

This could be due to increased game herds or a longer use period on the areas concerned. It is believed that the length of the use period was approximately the same each year. This would indicate that more deer and elk were present. Aerial elk counts tend to confirm an increase of elk.

In May 1955, to gain broader and more uniform coverage of the game winter range with pellet group plots the 100 foot staked established range condition transects were used as a base. A tape was stretched between the stakes and all pellet groups within four feet of the tape were counted and recorded. Possible correlations between game use and range conditions may come to light. Results are shown in Table 7.

TABLE 7
PELLET GROUPS ON LINE TRANSECT PLOTS, MAY 1955

Area	No. of Plots	Ave. Deer Pellet Groups Per Plot*	Ave. Elk Pellet Groups Per Plot*	Range Condition Rating
F. S. Horse Pasture	6	8.7	3.7	Mid-poor
Ridge above Galogly's	4	2.5	4.2	Fair
Ridge across from Ferguson's	2	2.5	3.5	Poor
Dick Cr. Bald Hill	10	4.8	7.5	High-poor
Barley Ridge	2	.5	5.5	Poor
Diggins Ridge	2	.0	7.5	Poor
Wallace Ridge	2	.0	10.0	High-poor
Bunch Gulch	3	14.3	4.0	High-poor

* 800 Sq. Ft. per pellet group plot

Most intensive use by elk occurred on Wallace Ridge and most intensive use by deer in the Bunch Gulch Special Use Pasture. No definite correlation between game use and range condition appears to exist at present.

Big Game Grazing Habit Observations: No intensive study of big game food habits has been undertaken. However, notes on grazing habits were recorded when observed.

The deer tend to use the browse-grassland areas during the early winter - December and January. The more plentiful browse

species on these areas are bitterbrush and mountain mahogany, which seem to be highly preferred and used first. In late winter - February and March - the deer use the grassland type extensively. It is presumed that they are using either grass or forbs as very little browse is present in this type. Stomach contents of a deer killed in late March 1955 were approximately 50 per cent dried grass, 30 per cent weeds and 20 per cent browse (snowberry, Douglas fir needles, ponderosa pine needles and Kinnikinnick). Deer tended to concentrate on the south slopes that greened up early in April and May. Observations indicated they were taking sprouting grass and forbs on such sites.

Elk were observed to come down to the lowest portions of their winter range in December and January for a few days and then sometimes go back to the higher portions of their winter range for the remainder of the winter. This behavior is interpreted as a winter range reconnaissance on the part of the elk. If good forage supplies are found on the lower portion of the range the elk spend most of the winter there. If poor forage supplies are found at the lower elevations they may go back up to higher portions of the range. There is also a possibility that this brief coverage of the entire winter range is to obtain some especially preferred food item.

Elk were observed to graze on the grassland types all winter and early spring. Observations indicated the elk consumed nearly all of the forbs and grass present. Balsam-root and rabbitbrush (Chrysothamnus) were used freely.

Elk and deer were both observed grazing on conifer seedlings.

BROWSE STUDY

On November 23, 1952 a group of members of Ravalli County Fish and Wildlife Ass'n., Sula Stockmen and Forest Service employees built a big game exposure on the East Fork of the Bitterroot. The wire was furnished by the Montana State Fish and Game Department and the posts by the Forest Service. All labor for construction was donated. The fenced plot which is 85.6' x 100' (.2 acre) is on National Forest land in the $SE\frac{1}{4}$ $NE\frac{1}{4}$ $NW\frac{1}{4}$ $NW\frac{1}{4}$ Sec. 33, T2N, R18W. An unfenced plot of the same area was staked to surround the fenced plot on three sides (north, west and south, 26.4 feet wide). Location of this study plot is shown on Map 6.

The plot was established as a demonstration area to show the effect of big game upon browse, timber, grass and soil. Of primary consideration in the selection of the plot was accessibility so it could be easily observed by interested people. The area is within 300 yards of the main East Fork road and is within 100 feet of the Old East Fork road. It is believed that the plot is in an area of somewhat lighter use than average for the East

Fork winter range. However, use has been heavy enough so the browse is in a deteriorated condition.

The exposure of the plot is mostly southerly. The slope is gentle. There is a partial overstory of sapling to pole size ponderosa pine and Douglas fir. The area was logged around 1900 and has not fully restocked. There is a good representation of bitterbrush and serviceberry, which are two key browse plants in this area. Pinegrass makes up most of the grass cover with some bluebunch wheatgrass and Idaho fescue. The area is lightly grazed by cattle.

On December 8, 1952 measurements were taken on palatable browse plants on the fenced and unfenced plots. Measurements on average crown diameter, average crown height and total inches of current annual growth were recorded for each browse plant. Total inches of current annual growth was obtained by actually measuring the new growth on every sprout, branch and lateral of the plant. A numbered metal tag was attached to each plant with a copper wire so that each plant can be remeasured periodically and the measurements compared.

Almost all palatable browse plants on the plots were found to be in poor vigor from heavy winter game use. There were some dead bitterbrush plants on the area and many others had only one branch of the original plant remaining alive. Serviceberry plants seemed to be barely surviving and producing very little forage. In one case a serviceberry plant with a crown diameter of 50" and a crown height of 32" produced a total of 44" of new growth this year. It was evident that the browse was producing much less food now than it has produced in the past. (Measurements on file Sula Ranger Station and District Montana Fish and Game Department Headquarters, Missoula.)

The tagged shrubs in the outside plot were remeasured each spring and fall. Results of these measurements are shown in Table 8. The winters of 1952-53, 1953-54 and 1954-55 were milder than normal. This made it possible for the game to remain spread out quite widely and there was little need for concentration along the East Fork bottoms where this exclosure is located.

It is believed that not over 50 per cent of the annual growth of browse plants can be taken each year and have the plant survive over a period of years. Thus, from the standpoint of proper use the browse near the East Fork exclosure has been overused each of the past three winters.

Growth of browse plants inside the exclosure has been greater than growth of browse plants outside the exclosure the past two years. This is thought to reflect better plant vigor due to the protection from grazing of the exclosed shrubs.

TABLE 8
SUMMARY OF BROWSE USE ON OUTSIDE PLOT OF EAST FORK GAME ENCLOSURE
IN 1952, 1953 AND 1954

Species	Number Plants	Total Growth			Growth Remaining In Spring			Amount Used			% of Growth Used		
		1952	1953	1954	1953	1954	1955	1953	1954	1955	1953	1954	1955
Bitterbrush	11	3355	2420	3603*	603	564	674*	2752	1856	2929	82	77	81
Serviceberry	9	275	240	321	153	236	211	120	4	110	43.5	1	34
Willow	1	89	121	162	37	121	27	52	0	135	41.5	0	83
TOTAL	21	3719	2781	4086	795	921	912	2924	1860	3174	79	67	77

* Only 10 Bitterbrush Plants

A difference in volume of low browse, such as kinnikinnick and Oregon grape, was noted between the fenced and unfenced plots in the spring of 1954 and 1955. This would suggest significant use of these low browse plants by game in this area. No measurements are being taken on this type plant.

The Sula Unit has a relatively low density of palatable browse plants present on the winter range areas. Fair stands of mountain mahogany do exist along the steep south and west sides of the East Fork River, but many of these plants are over mature and out of reach of deer. Mahogany plants available to game are hedged with probably 90 to 100 per cent of the current annual growth utilized each year. The browse present shows gross overuse and in many areas is dead or is dying out, presumably due to repeated overuse. There appears to be little chance for new browse plants to become established with present numbers of big game. If accepted proper browse use was used as a criteria for stocking in the Sula Unit, probably only a fraction of the present game population could be carried.

While both elk and deer take browse when available, the lack of browse in the Sula Unit is more of a limitation to deer than elk. The superior ability of the elk to obtain ground forage during periods of deep snow give the elk an advantage over deer during severe winters. Thus, with relatively large areas of grassland and limited browse present, the Sula Unit is probably better adapted to elk than deer.

CONIFER SURVIVAL STUDIES

The economy of Darby, Montana, is based on the lumber industry. Logs for the Darby sawmills come mostly from National Forest lands on the East Fork and the West Fork of the Bitterroot drainage. A perpetual supply of logs from National Forest lands is necessary to keep Darby's economy stable and prosperous.

To keep a sustained production of sawlogs, the logged-over areas must be promptly reforested, either naturally or artificially, with desirable tree species. The two main sawlog species in these areas are Douglas fir and ponderosa pine. Because the ponderosa pine has a selling value about 50 per cent higher than Douglas fir, it is desirable to raise as much pine as possible. Much of the area now supporting mixed pine and fir stands would regenerate to almost pure fir if allowed to reproduce naturally, as the fir is a more prolific seeder and establishes itself more easily under partial shade. Therefore, the better ponderosa pine sites, lacking adequate reproduction, should be planted with pine immediately after logging to hold those areas in pine. The other areas, allowed to reproduce naturally, will usually be dominated by the fir.

Some of the ponderosa pine-Douglas fir type shows a pronounced high line from past winter game use. In these areas the young trees dead from browsing are conspicuous. In some areas, conifer reproduction is absent, but there are not enough young trees around to give definite evidence that game is keeping the reproduction out. In other areas reproduction is satisfactory with winter game browsing negligible or light enough that the young conifers are able to survive and make good growth.

One of the logical criteria to use in establishing the carrying capacity of the big game winter range on the East Fork is the survival of conifer reproduction on most of the ponderosa pine-Douglas fir type. It is, therefore, essential to know the effect winter game use has on conifer reproduction in the varying situations throughout the ponderosa pine-Douglas fir type. In the areas showing definite high lining it is obvious from casual observation that conifer reproduction will not survive under present winter game use. In the areas where conifer reproduction is absent, with an open forest floor, a study is necessary to determine the effect of game on conifer reproduction. In areas with satisfactory reproduction showing some browsing, it is necessary to have a record of the condition of the conifers to determine if the seriously damaged area is getting larger or smaller.

Three study areas have been established to date in an effort to gain factual information on game-conifer survival relationships (note Map 9).

I. JENNINGS CAMP CREEK PONDEROSA PINE PLANTATION SURVIVAL STUDY

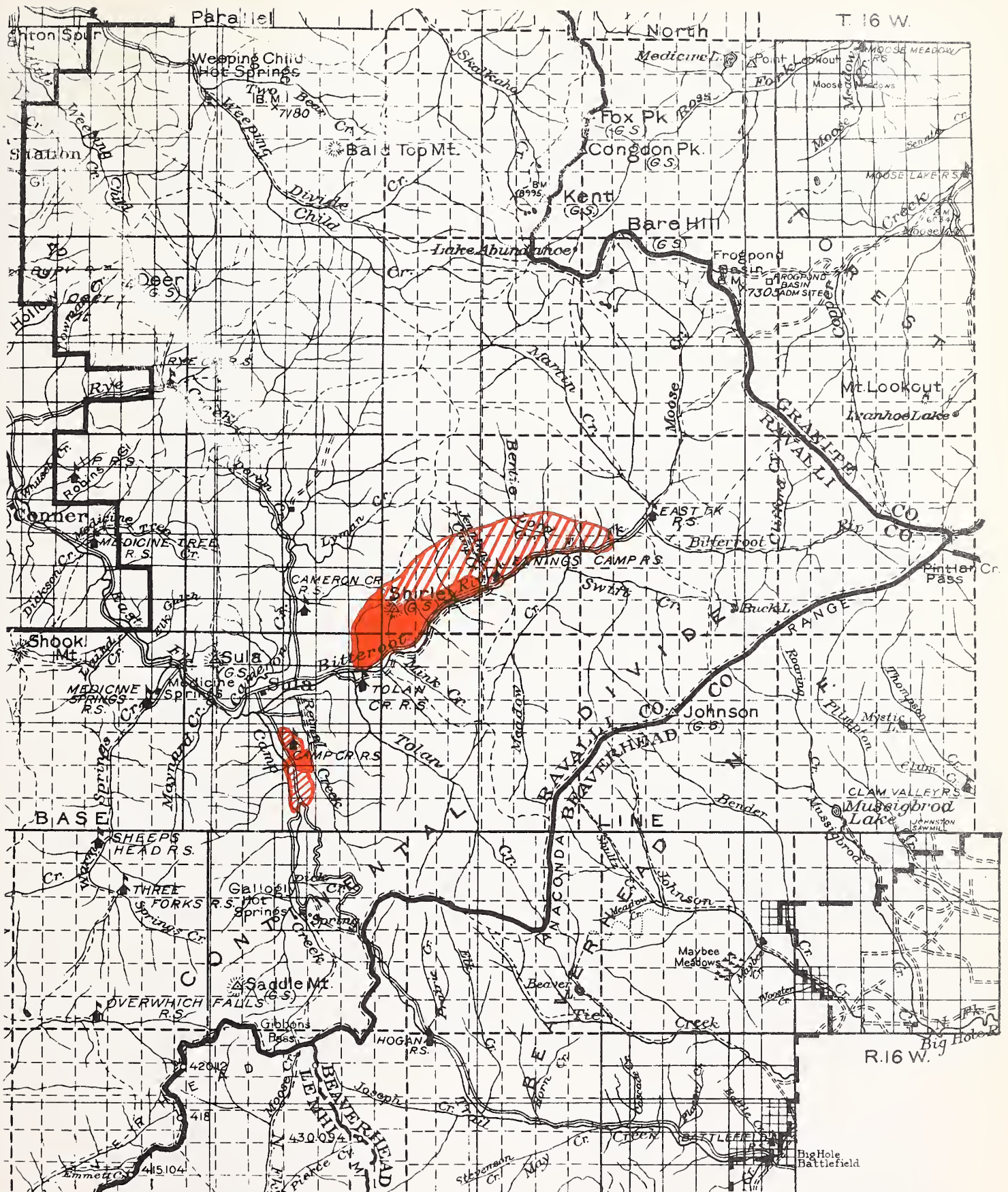
Jennings Camp Creek is a small side drainage of the East Fork of the Bitterroot. It comes into the East Fork from the north about nine miles above Sula. It is timbered with ponderosa pine and Douglas fir at the lower elevations and with lodgepole pine at the higher elevations.

A sawlog timber sale of 4,400 M ft. b.m. of Douglas fir and 1,300 M ft. b.m. of ponderosa pine was made in Jennings Camp Creek the summer of 1950. This timber was cut from about 650 acres mostly in Section 21 and the E $\frac{1}{2}$ of Section 22, T2N, R18W, M.P.M. Logging was completed by the summer of 1953. The ponderosa pine on the area was selectively cut taking about 50 per cent of the merchantable trees. The Douglas fir was cut more heavily, taking most trees larger than 17 inch d.b.h.

The residual stand consists of the younger age classes of Douglas fir, about half of the original mature ponderosa pine and the younger age classes of pine. There is practically no natural reproduction, pine or fir, less than fifteen feet in height on the area.

The stand is now opened up and natural reproduction should become established within the next few years. There is a good seed source for the entire area. It is thought that Douglas fir will dominate

EAST FORK OF BITTERROOT AREA



MAP 9: USE OF CONIFERS BY BIG GAME IN SULA UNIT

Heavy use of conifers
 Moderate use of conifers
 Light or no use

1. East Fork Exclosure Study Plot
2. Jennings Camp Creek Study Plot
3. Tepee Creek Study Plot

most of the area, as it is generally a fir site and the fir seed source is abundant.

The better ponderosa pine sites were "fill in" planted with three-year-old (2-1) pine stock the spring of 1954. This planting was done only on the better pine sites in openings and partially stocked areas. A total of 8 M trees were planted on about 40 acres of pine site.

The ponderosa pine-Douglas fir type of Jennings Camp Creek is within the spring-fall range of the deer and elk and is used almost all winter during an average winter. On severe winters game is forced from the area by deep snow. Palatable browse is in poor condition from heavy game use.

Because this area is believed to be close to the critical point where game use is light enough to permit conifer survival it was selected as a study area. Four plots containing 100 planted ponderosa pine each were established. The rows and individual trees were staked and numbered immediately after planting the spring of 1954. The plots will be re-examined each spring before cattle are turned out and each fall after cattle are brought in, to isolate winter game use from summer use by cattle and game. This study should be continued until the planted trees are about six feet in height.

The plots were examined November 9, 1954, by Forest Service and Fish and Game Department personnel.

On the four plots, a total of 313 out of 400 trees were found alive. This can be considered a successful planting as 78 per cent of the trees survived the first growing season which is the time most of the natural mortality takes place. Natural mortality from drought and competition should be of minor importance in this planting from now on. Fourteen live seedlings or 4.5 per cent had their terminals browsed and 27 or 8.6 per cent had their needles browsed.

All of the plots showed some browsing. As the area was used by cattle, game and rodents during the summer, it was not possible to say what did the browsing. The manner of the needle browsing indicated a strong possibility that rodents may have been doing some of the browsing. None of the browsing observed was heavy enough to kill the trees.

The plots were checked May 26, 1955, and 305 of the conifers were found alive. Several of the seedlings in one plot had been destroyed by slash fires. Forty-one or 13 per cent of the seedlings had been needle browsed and 41 or 13 per cent had their terminals browsed. Tracks and pellet groups indicated use by both deer and elk.

II. TEPEE POINT NATURAL CONIFER REPRODUCTION BROWSING STUDY

The Tepee Point natural conifer reproduction study area is about a mile west of the junction of Moose Creek and the East Fork. It is on the south facing slope from Tepee Point to the East Fork of the Bitterroot. It starts above the Tepee Point road in the center of the SW $\frac{1}{4}$, Section 17, T2N, R17W, M.P.M.

This area is in a mixed ponderosa pine-Douglas fir type. Ponderosa pine dominates on the south facing slopes and Douglas fir dominates on the north and east facing slopes. The area was selectively logged during 1948 and 1949. About half of the mature pine was cut and most of the Douglas fir larger than 17" d.b.h.

The residual stand is made up of the more vigorous mature pine and the younger age classes of pine and Douglas fir. There is fair reproduction of both ponderosa pine and Douglas fir on the area, although there are still many openings that haven't regenerated since logging. Reproduction of all sizes from 6" on up is present on the area and is surviving and making satisfactory growth.

The area is used by big game, especially elk, spring, fall and most of the winter, if the snow depths are light. On an average winter game is forced from the area for about a month. It is used by quite large numbers of elk at certain periods during the year. Deer also use the area, but are outnumbered by the elk. Palatable browse is in poor condition from heavy winter game use.

It is felt a study of reproduction in this situation would be worthwhile as it will provide a standard to judge whether the area of excessive conifer browsing is becoming larger or smaller.

On December 15, 1954 Forest Service and Fish and Game Department personnel established this study of big game browsing on natural reproduction. A total of 99 trees, 65 ponderosa pine, 34 Douglas fir, were tagged for the study. The trees selected were from 6" to 72" in height. The trees were marked with a permanent numbered metal tag, species recorded, total length of main stem recorded and remarks made on past browsing, form, vigor, etc.

It was found that many trees had been browsed at some time in the past. The past browsing on some Douglas fir had been heavy enough to give them a bushy appearance. Past browsing on pine occasionally showed itself by a forked stem, but had not been heavy enough to give a hedged appearance. There appeared to be a preference for Douglas fir over ponderosa pine in this area. Except for a few bushy fir, the reproduction was making satisfactory growth and appears to be able to grow above the reach of the game in a few years at the present intensity of browsing.

This plot will be examined each spring and fall to record conditions and use. The fall examinations are necessary to eliminate the cattle factor, as cattle use the area during the summer. The current

use at each examination is to be recorded for each tree as none, very light, light, moderate, heavy, or very heavy. Following are the tentative standards worked out when the study was planned.

Very light	- Needles and a trace of tips of laterals
Light	- Less than 10% of tips of laterals
Moderate	- Terminal browsed and/or 10% to 25% of tips of laterals browsed
Heavy	- 25% to 50% of tips of laterals browsed
Very heavy	- 50% or more of tips of laterals browsed

As the study continues it may be necessary to adjust these tentative standards.

These tagged conifers were checked May 27, 1955 and six (6%) per cent of the 99 were found to have light needle browsing. None of the browsing observed was heavy enough to kill the seedlings.

III. EAST FORK EXCLOSURE CONIFER SURVIVAL STUDY

A game exclosure one-half mile west of the junction of Guide Creek and the East Fork was constructed the fall of 1952. This is in an area lacking conifer reproduction.

At the time of the original forage inventory in December 1955 no live conifer seedlings were found. However, fourteen small sapling Douglas fir and one ponderosa pine that were dead from apparent over-browsing were observed on the fenced and unfenced plots (.2 acre plots).

In May 1953, 50 ponderosa pine and 50 Douglas fir seedlings were planted inside the exclosure and a similar number planted outside the exclosure. The summer and fall of 1953 was very dry, so the survival of the seedlings was poor. A check of these seedlings in the fall of 1953 showed that 55 ponderosa pine and 54 Douglas fir were still alive. No browsing on these seedlings was noted at this time.

A thorough search of both the fenced and unfenced plots for new natural seedlings was made the fall of 1953. It was found that many Douglas fir seedlings had started the spring of 1953. There were 27 fir seedlings and one pine seedling inside the fence and 16 fir seedlings in the unfenced plot. Thus, there were 75 per cent more new seedlings started in the fenced plot than in the unfenced plot.

The plantings were re-examined in April 1954. In the unfenced plot 27 ponderosa pine and 17 Douglas fir were still alive. On the fenced plot 24 ponderosa pine and 21 Douglas fir were alive. Eleven or 45 per cent of the 27 ponderosa pine in the unfenced plot had been grazed during the winter. None of the seedlings in the fenced plot had been grazed. Game was believed to have

done the grazing as none was noted in the fenced plot where small rodents could have grazed.

These plots were checked November 9, 1954 and it was found that 27 pines and 17 firs were still alive outside the exclosure and 23 pine and 21 fir were still alive on the inside of the exclosure. A careful check for natural conifer seedlings on the plots was made. Six fir and no pine natural seedlings were found outside the exclosure. Twenty-nine fir and one pine natural seedlings were found inside the exclosure. Thus, 400 per cent more natural seedlings were present in the fenced plot than the unfenced plot.

The plantings were re-examined on May 27, 1955 and 17 ponderosa pine and 6 Douglas fir were found still alive in the unfenced plot and 23 ponderosa pine and 12 Douglas fir were found alive inside the exclosure. Sixteen or 94 per cent of the 17 ponderosa pine and one or 20 per cent of the five Douglas fir outside the exclosure had been grazed. None of the 35 live seedlings inside the exclosure were grazed.

The heavy use of the conifer seedlings on the outside plot was believed to have been by elk and/or deer as tracks and droppings of both were present.

TREND IN BIG GAME HARVEST

The harvest of big game animals is probably one of man's most effective management procedures. Periodic information on hunter kill in the Sula Unit is given in Table 9.

TABLE 9

BIG GAME HARVEST - SULA UNIT

Year	Source of Information	Deer Killed	Elk Killed
1922	F. S. Figures	8	0
1930	F. S. Figures	62	27
1942	Mont. Fish & Game Dept. Checking Station	361 (bucks)	221
1944	" " " "	92	18
1945	" " " "	460	112
1953	" " " "	398	100*
1954	" " " "	148	87

* Includes elk killed by special permit.

These should represent minimum kill figures. They indicate that of the years when checking stations have been operated, the largest number of elk were harvested in 1942 and the largest harvest of deer occurred in 1945.

It is believed that some elk and possibly some deer that winter in the Sula Unit are present in the adjoining Beaverhead and Deerlodge Forest areas during the hunting season. Therefore, the harvest on the Sula Unit wintering big game herds is considerably more than hunter checking stations in the Bitterroot would indicate. Also, based on cold storage locker checks it was found that between 25 and 30 per cent of the elk killed in the area were not checked at the station. Thus, the number of animals reported killed at the checking stations should be considered an index to the trend of hunter harvest and the minimum harvest only.

Considering 1953 and 1954 it is indicated that fewer elk were killed in the Sula Unit in 1954 than in 1953, and approximately 50 per cent less mule deer were harvested in 1954 than in 1953.

Based on observations made during the winter of 1936 and 1937, Longworth, et al (1937) recommended that the East Fork big game herds should be maintained at the approximate population levels observed at that time (521 elk and 781 mule deer).

Hollibaugh (1942) recommended that the mule deer population be reduced to 1250 head, and the elk herd to 650 head in 1942. To accomplish this he suggested a harvest of approximately 800 deer and 385 elk (also a closed area to the west where game could possibly be forced onto and off the critical Sula Basin winter range areas). Hollibaugh suggested the taking of doe deer.

Thompson (1946) recommended that the season be opened on doe deer, up to a limit of 300 does, and that an extended season on branch antlered elk be held after the regular season in 1946. In 1947 lower numbers of mule deer and elk were indicated by the brief census so that a return to buck hunting and either sex elk hunting from October 15 to November 15 was recommended.

Considering the poor condition of portions of the game winter range and light harvest during the regular 1953 hunting season it was recommended that a special season on deer to take another 300 deer of either sex be held and that 50 permits for either sex elk be issued. These recommendations were put into effect and approximately that number of elk and deer were taken.

Considering the higher aerial elk count made during the winter of 1953-54 compared to the 1952-53 winter count it was recommended that 300 elk be harvested from the East Fork wintering herds in 1954 and that this could be accomplished by keeping the season on elk open until 150 elk had been reported killed in the East Fork, Rye Creek and Beaverhead areas at the Darby Checking Station. This recommendation was accepted but a limitation of time (to

close November 25, 1954) was put into effect.

Periodic big game hunting regulations are shown in Table 10.

TABLE 10

BIG GAME HUNTING REGULATIONS IN SULA UNIT 1946-1955

Year	Elk	Deer
1928	Nov. 11 to 15 Either Sex	
1930	Nov. 11 to 15 Either Sex	
1940	Oct. 15 to Nov. 15 Either Sex	
1945	Oct. 15 to Nov. 15 Either Sex (Closed Area West of Hi. 93)	Oct. 15 to Nov. 15 Either sex (Closed Area West of Hi. 93)
1946	Oct. 15 to Nov. 15 - Either Nov. 16 to Nov. 30 Antlered Bulls	Oct. 15 to Nov. 15 Either Sex
1947	Oct. 15 to Nov. 15 Either Sex (Closed Area West of Hi. 93)	Oct. 15 to Nov. 15 Bucks (Closed Area West of Hi. 93)
1948	Oct. 15 to Nov. 15 Antlered Bulls	Oct. 15 to Nov. 15 Bucks
1949	Oct. 15 to Nov. 15 Either Sex	Oct. 15 to Nov. 15 Bucks
1950	Oct. 15 to Nov. 15 Either Sex	Oct. 15 to Nov. 15 Bucks
1951	Oct. 15 to Nov. 15 Either Sex	Oct. 15 to Nov. 15 Bucks
1952	Oct. 15 to Nov. 15 Either Sex	Oct. 15 to Nov. 15 Bucks Nov. 8 to Nov. 15 Either Sex
1953	Oct. 15 to Nov. 15 50 Either Sex Permits	Oct. 15 to Nov. 15 Bucks Nov. 29 to Dec. 5 and Nov. 1 to Nov. 15 Either
1954	Oct. 15 to Desired Harvest or Nov. 25	Oct. 31 to Nov. 15 Either Oct. 15 to Oct. 30 Bucks
1955*	Oct. 15 to Desired Harvest Either (200-225 Elk Checked) Bull Permits after Regular Season Suggested	Oct. 15 to Desired Harvest Either Sex (225-250 Deer Checked)

* Recommended

The 53-54 hunting seasons were characterized by more moderate than average weather conditions. Very little snow occurred either

year to force the game down from the high country. However, light snows did occur a few days before the start of the season in 1954, but disappeared quickly during the clear sunny weather that lasted until near the end of November. Thus, weather conditions were not conducive to obtaining very large harvests of big game either year.

A big game hunter checking station was operated at a point where most returning hunters from the East Fork area (and other areas) could be contacted and biological information obtained during the 1953 and 1954 hunting seasons. The station was operated at a regular Highway Department truck weighing station where ample space for the hunters to pull off the highway was present, as well as a platform scale to weigh game animals and a small building to use as an office. It was operated by one man except on weekends when two operators were required to prevent holding up returning hunters an unduly long time.

Although the checking station location had certain advantages, as given above, it had the disadvantage that its location on the oiled highway prevented checking hunters in and out, which in turn, meant that information regarding the total number of hunters was not gained. Very few unsuccessful hunters stopped on their way home. Number of game checked is given in Table 11.

Sex and Age of Big Game Checked: Elk - The sex and age of the elk that were checked and reported killed in the Sula Unit and adjoining areas is given in Table 11. No attempt was made to age the elk other than to record adult bulls, cows, calves and spike bulls.

TABLE 11

SEX AND AGE OF ELK REPORTED KILLED IN THE SULA UNIT, RYE CREEK AND TRAIL CREEK BY 15 DAY PERIODS DURING 1953 AND 1954

Date	Adult Bulls		Cows		Calves		Spike Bulls		Total Number
	Number	% of Kill	Number	% of Kill	Number	% of Kill	Number	% of Kill	
1953									
Oct. 15-									
Oct. 31	31	44.3	24	34.3	11	15.7	4	5.7	70
Nov. 1-									
Nov. 15	14	41.2	11	32.4	4	11.7	5	14.7	34
Nov. 29-									
Dec. 20	<u>11</u>	<u>28.2</u>	<u>22</u>	<u>56.4</u>	<u>4</u>	<u>10.3</u>	<u>2</u>	<u>5.1</u>	<u>39</u>
Total 1953	56	39.2	57	39.8	19	13.3	11	7.7	143

TABLE 11 (Continued)

SEX AND AGE OF ELK REPORTED KILLED IN THE SULA UNIT, RYE CREEK AND TRAIL CREEK BY 15 DAY PERIODS DURING 1953 AND 1954

Date	Adult Bulls		Cows		Calves		Spike Bulls		Total Number
	Number	% of Kill	Number	% of Kill	Number	% of Kill	Number	% of Kill	
1954									
Oct. 15-									
Oct. 31	34	45.8	17	22.9	9	12.5	14	18.8	74
Nov. 1-									
Nov. 15	16	43.2	10	27.0	5	13.5	6	16.3	37
Nov. 16-									
Nov. 25	<u>5</u>	<u>26.3</u>	<u>11</u>	<u>57.9</u>	<u>2</u>	<u>10.5</u>	<u>1</u>	<u>5.3</u>	<u>19</u>
Total 1954	55	42.3	38	29.2	16	12.3	21	16.2	130
Total for 1953 & 1954	111	40.7	95	34.8	35	12.8	32	11.7	273

These results tend to indicate:

- A. More adult bulls (bulls $2\frac{1}{2}$ years of age or older) have been killed the past two seasons than any other age or sex class. Possible reasons for this may be: the bulls lighter color and antlers make them easier to see, their habit of bugling often makes their presence known to the hunter and the fact that they tend to be bolder and roam around more than cows increases the chances of their being sighted by hunters. A higher proportion of adult bulls are killed during the earlier portions of the season than during the later portions of the seasons. A possible reason for this may be that they are often still bugling during the early part of the season and usually not during the later portions.
- B. Calves made up approximately the same porportion of the kill each year. It is generally believed that calves are not killed in proportion to their occurrence in the herds (more being present than proportion of kill would indicate) due to hunters selecting the larger animals.
- C. The number and percentage of kill of spike bulls was higher in 1954 than in 1953. Some elk managers believe that spikes are taken in excess of their occurrence in the herds more than any other sex or age class because they seem to be in a stage of life when they roam around a great deal. The fact that a higher proportion of spikes were taken in 1954

compared to 1953 might be due to: 1) better survival of the 1953 calf crop (spikes of 1954) than the 1952 calf crop, 2) differences in the hunting pressure between the two years, or 3) a smaller calf crop in 1952 than in 1953.

Deer - Whenever possible (if the head was present) each deer was aged when checked through the station or the lower jaw collected for future analysis. All the deer checked except two were mule deer (two white-tailed). Since an accurate method for aging older mule deer has not been developed all animals over $2\frac{1}{2}$ years of age were classes as adults. Results are given in Table 12.

TABLE 12

AGE OF DEER REPORTED KILLED IN THE SULA UNIT, RYE CREEK AND TRAIL CREEK IN 1953 AND 1954

	Regular 1953 Season			Extended 1953 Season			Regular 1954 Season		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Fawns									
Number Checked	8	9	17	14	15	29	17	18	35
% of Kill	16	18	16	20	14	17	19	31	24
$1\frac{1}{2}$ Year Class									
Number Checked	23	12	35	29	30	59	42	12	54
% of Kill	45	23	34	41	29	34	47	21	36
$2\frac{1}{2}$ Year Class									
Number Killed	12	13	25	13	11	24	18	11	29
% of Kill	23	25	25	18	11	14	21	19	20
$3\frac{1}{2}$ Years and Older									
Number Checked	8	17	25	15	47	62	12	17	29
% of Kill	16	34	25	21	46	35	14	29	20
Total Numbers	51	51	102	71	103	174	89	58	147

These results indicate:

- A. The East Fork deer herds were composed of a higher proportion of young deer (fawns and yearling) in 1954 than in 1953. This could be due to a reduction of the older deer by the relatively liberal 1953 hunting season or by increased survival of the 1953 fawn crop (yearlings of 1954) and a higher fawn crop in 1954 (more results needed).
- B. A higher proportion of older deer are harvested during a late season than during the regular season based on results in 1953. This may be due to the older deer coming down later in the season or to the fact that the younger deer are not as wary as the old ones and are thus killed first.

Sex ratios of the Sula Unit deer herds based on kill during the either sex portion of the hunting season each year:

1953 Season - 77 Bucks : 100 Does

1954 Season - 115 Bucks : 100 Does

Considering the fact that a relatively high proportion of the kill each year is made up of spike bucks it is suggested that possibly these bucks are easier for the hunter to get or that hunters are selective toward spikes, and thus, the sex ratio of the kill is not actually the sex ratio of the herds concerned. Additional relationships regarding sex and age of kill is given in Table 13.

TABLE 13

BUCK-DOE-FAWN KILL IN THE SULA UNIT IN 1953 AND 1954

	Bucks	Does	Fawns	Total
1953 - Regular Season				
Number	43	42	17	102
% of Kill	42.2	41.3	16.5	100
1953 - Extended Season				
Number	57	88	29	174
% of Kill	32.8	50.6	16.6	100
1954 - Regular Season				
Number	72	40	35	147
% of Kill	48.9	27.2	23.9	100

A higher proportion of does was taken during the late extended season in 1953 than during the regular hunts of 1953 and 1954.

Crippling Loss: Hunters were questioned regarding big game shot and lost and crippled animals found dead or shot. During the 1953 season three deer and six elk were reported to have been wounded but not recovered. One elk and three deer were reported found dead - apparently lost cripples. Assuming that these reports were all separate animals, it is suggested that at least a 2 per cent crippling loss of deer and a 7 per cent crippling loss of elk occurred in 1953.

In 1954, eight elk and four deer were reported crippled or found crippled. This would suggest a minimum of 3 per cent crippling loss of deer and a 9 per cent crippling loss of elk.

Residence of Area Hunters: Approximately 70 per cent of the big game is killed by residents of Ravalli County, 12 per cent by residents of Missoula County, 14 per cent by residents of other Montana counties, and 4 per cent by out-of-state hunters. More out-of-county hunters come to the area during extended portions of the season.

TENTATIVE CONCLUSIONS AND RECOMMENDATIONS

This project is still in the basic phases. Techniques and basic facts have to be established before any definite trends, let alone conclusions, can be determined. However, in the two years that observations have been made in the Sula area some tentative conclusions seem justified.

General observations and special studies have indicated that, with the exception of overuse of limited exposures of some of the high bald hills, no problem exists concerning big game use of summer range. However, it is believed that in most areas big game use is near the capacity of the forage supply. Therefore, no further increases in the big game population or use by livestock is recommended in the summer range areas of the Sula Unit.

The poor range conditions existing in portions of the Sula Unit are probably to a high degree due to excessive overuse of the ranges 30 to 50 years ago. Reports indicate that approximately ten times more livestock were grazed in the area in 1910 than at present. However range use in the past thirty years has apparently been too heavy to allow a recovery of the range. This situation suggests the wisdom of the old proverb, "An ounce of prevention is worth a pound of cure."

The food requirements of elk and deer numbers on the winter and spring-fall range areas of the Sula Unit at present exceed the forage supply available. It is recommended that some reduction be made in the elk herds and the deer herds should not be allowed to increase in this area. The following observations tend to indicate this conclusion:

1. The use of browse plants has been very heavy the past three winters during which the weather conditions were more moderate than normal. Considerable amounts of browse are dead or dying apparently from overuse by game.
2. Elk and deer tend to concentrate on some south and west exposed grasslands which are in unsatisfactory condition (some such areas are eroding badly). This heavy game use apparently is contributing to the problem of correcting these unsatisfactory conditions.

3. It is probable that big game use of conifer reproduction is preventing the establishment of satisfactory reproduction over portions of the Sula Unit. The heavy use of conifers is indicative of the low density of other more palatable forage.

The elk population has increased the past three years. One hundred elk were reported killed on the Sula Unit in 1953 and 87 were reported killed in 1954. Thus, to bring about a reduction in the elk population it is recommended that either sex elk hunting be allowed from October 15, 1955 until at least 200 elk have been reported killed in the Sula Unit. Fifty extra bulls should be taken by permit after the regular season to further reduce grazing pressure. The mule deer population is believed to have been reduced by a known kill of 398 deer in 1953. The deer population apparently was higher after 147 deer were reported killed in 1954. Thus, to hold the deer population at present levels it is recommended that either sex hunting be allowed from October 15, 1955 until 225 to 250 deer have been reported killed in the Sula Unit.

It is recommended that a hunter checking station be operated during the hunting season to determine the kill and obtain other biological information regarding the big game of the area.

To gain more information regarding the migration and distribution of elk wintering in the Sula area it is recommended that trapping and tagging continue until approximately 100 elk are tagged in the area north of the East Fork River.

It is recommended that range condition, browse utilization and conifer survival studies continue.

It is recommended that aerial counts be made to determine the elk population trends, and pellet group plots established and rechecked where already present to obtain an index of range use by big game.

SUMMARY

A land resource plan was prepared as a basis for resolving problems which concerned wildlife and other land uses in the Sula area. Studies of big game and the lands they use are being conducted by the Montana Fish and Game Department and the U. S. Forest Service in this area to gain factual information to be used as a basis for recommending big game management consistent with land capabilities and in harmony with other land use interests in the Sula Unit.

The Sula Unit comprises most of the drainage of the East Fork of the Bitterroot River. Land uses include timber production, livestock production, recreation, wildlife and watershed management.

To obtain information on migration and distribution of the big game, 65 elk and 4 mule deer have been trapped on the winter range area and tagged with serially numbered aluminum butt-end tags during the winters of 1953-54 and 1954-55. Three of the tagged elk were killed by hunters during the 1954 hunting season. Ten of the elk tagged in 1953-54 were recaptured during the 1954-55 trapping periods.

Ground and aerial observations indicate elk and deer concentrate on the winter range from approximately January 15 to May 15. The timbered areas at intermediate elevation receive greatest game use from December 1 to January 15 and from May 15 to July 15. The open meadows, burns and open aspects of the sub-alpine zone along the Rock Creek-Bitterroot and Big Hole-Bitterroot divides are used by game mostly during the summer and early fall.

The grassland and timber-grassland vegetation areas at the lower elevations have relatively low grazing capacities due to lack of moisture, loose granitic soils and steep slopes. There is a low density of palatable browse species present. Desirable forage is restricted to openings in the extensive lodgepole pine association.

Range inspection trips have been made with representatives of sportsmen, stockmen, Forest Service and Fish and Game Department participating each fall and spring from the fall of 1953 to the spring of 1955. These inspections have tended toward unity of thought of the various groups concerning land and vegetative conditions. The condition of the various grazing allotments was evaluated in the fall of 1953 and a map showing range and soil conditions and degree of utilization was prepared.

These inspections have indicated: 1) many of the south and west exposed slopes in the grassland association are in poor vegetative and/or soil condition, with overutilization of current forage occurring, 2) north and east exposures are generally in fair or good condition, with under or proper utilization occurring, 3) utilization of forage on south and west exposures during the winter has been heavy, and 4) lighter utilization of the ranges by cattle was noted after the reduced grazing season in 1954 but by spring most of the south and west slopes were considered to have been overutilized.

Parker range condition transects have been or will be established on critical range areas over the Sula Unit to determine the trend in range conditions. Fourteen clusters of two line transects each have been established to date. These transects confirmed ocular range condition evaluations by indicating significant areas of the range were in poor condition.

Two study sites have been established to obtain information on the individual effects of cattle and big game use on range conditions. On the Dick Creek Bald Hill four similar plots (.2

acre) were selected and Parker transects established in each. One of these will remain unfenced and receive cattle and game use. One will be fenced during the winter and early spring to exclude game. One will be fenced during the summer to exclude cattle. One will be fenced permanently and will receive no grazing use. Checks in May 1955 showed considerably more forage to be present in the game exclosed plots than on the surrounding range.

The steep bald hill east of the Sula Ranger Station is fenced and no livestock use is planned for the next few years. A game exclosure was built in this pasture in the fall of 1954. Thus, ranges receiving only game use, a combination of game and cattle use and no grazing use are present. Parker transects will be established on similar sites of each use type to determine range trends on each.

To determine relative game use nine pellet group plots were established on winter range areas in May 1954. A recheck of these plots in May 1955 indicated greater game use during the winter of 1954-55 than the winter of 1953-54.

To provide a better coverage of the winter range areas the 27 range condition transects established in 1953 and 1954 were used as a base for pellet group plots. Highest intensity of elk use was noted on the higher bald hills and highest degree of deer use was found on the lower bald hills.

General observation of browse over the area indicated gross overuse with a considerable number of browse plants dead or dying with little evidence of young plants coming for replacement. Twenty-one browse plants were tagged near the mouth of Guide Creek and the annual growth measured in the fall, and spring to determine use. During the winter of 1952-53, 79 per cent of the past year's growth was used. During the winter of 1953-54, 67 per cent use occurred. During the winter of 1954-55, 77 per cent of the annual growth was used. It is believed that no more than 50 per cent of the annual growth of browse plants should be consumed annually if the condition of the browse stands are to remain good over a period of years.

In an effort to determine relationships between big game use and conifer reproduction three study areas have been established. One is located at a site where no young natural conifer reproduction is present, one at a site where very little natural conifer reproduction is present and one at a site where satisfactory conifer reproduction is present. Results to date indicate: 1) frequent grazing of conifer seedlings in the area where no natural conifer reproduction is present, 2) moderate grazing of seedlings in the area where there is little conifer reproduction present, and 3) very light grazing of conifers in the area where satisfactory conifer reproduction is present.

Livestock grazing was extremely heavy from 1895 to approximately 1920 with year-long free use of the range. A peak for recent years in cattle and horse numbers occurred in 1953. Sheep have not used the area in recent years. Livestock grazing pressure on the open rangelands was reduced approximately 20 per cent in 1954 and further reduction is planned for 1955 by eliminating all horse use, some cattle use and shortening the grazing season 45 days.

The big game populations in the area have generally tended to increase during the past thirty years. Recent aerial censuses indicate increases in the wintering elk population. The mule deer population in the area is believed to be lower than it was approximately ten years ago.

Highest harvest of elk probably occurred in 1942 and highest harvest of deer probably occurred in 1945. During the study period, more elk and deer were harvested in 1953 than in 1954.

Tentative conclusions suggest too many elk and deer for the amount of winter forage available.

It is recommended that more elk and deer should be harvested and studies now in progress should continue.

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BIBLIOGRAPHY

- Craighead, John J. 1952. A biological and economic appraisal of the Jackson Hole elk herd. N. Y. Zoological Society and Conservation Foundation, 32 pp.
- Buechner, Helmut K. 1952. Winter-range utilization by elk and mule deer in southeastern Washington. Jour. Range Mgt., 5(2): 76-80.
- Hall, John M. 1955. Livestock and big game relationships. Jour. Range Mgt., 8(1): 4-6.
- Hamre, V. O. and M. J. Watt. 1953. A plan concerning use, protection and development of wildlife habitat on the Sula District, Bitterroot National Forest, U.S.F.S. mimeo., 32 pp.
- Hollibaugh, G. W. 1942. Bitterroot winter game study. P-R Job Completion Report, Montana Fish and Game Dept., 22 pp., unpublished.
- Longworth, J. E., H. H. Hartson and C. W. Shockley. 1937. Winter game study, Montana portion of Bitterroot National Forest. Job Completion Report, U.S.F.S., 7 pp., unpublished.
- McDowell, L. E. 1949. Bitterroot Unit Big Game Survey and Investigation. Job Completion Report, P-R Quarterly Report, January-March 1949, 6 pp., unpublished.
- Murie, O. J. 1951. The elk of North America. The Stockpole Company, Harrisburg, Penn., and the Wildlife Management Institute, Wash., D. C., 376 pp.
- Stoddart, L. H. and D. I. Rasmussen. 1945. Deer management and range livestock production. Circular 121 Agri. Exp. Stn., Utah State Agricultural College, Logan, Utah, 17 pp.
- Thompson, W. K. 1946. East Fork of the Bitterroot inspection. Job Completion Report, Montana Fish and Game Dept., 3 pp, unpublished.
- _____. 1947. Bitterroot valley cooperative game census. Job Completion Report, Montana Fish and Game Dept., 6 pp, unpublished.
- Upchurch, M. L. 1954. Economic aspects of livestock-big game relationships. Jour. Range Mgt., 7(6): 245-249.
- Wright, J. T. 1954. The cooperative Kaibab north livestock-deer forage relationships study. Arizona P-R Quarterly Report, 95 pp..

STATE	Montana
PROJECT NO.	W-60-R-2
DATE	July 15, 1955
VOL.	VI NO. 2

Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report Job No. III-C Investigations Project

Title of Job: Evaluation of Artificial Salting and Aerial Salt Distribution

ABSTRACT

Evaluating the use of salt as a management tool is an extremely complex problem. Clarification of salting objectives was considered imperative to evaluate effectiveness of salt. Big game acquire a taste for salt and will use salt when it is made available. Although use of salt has become a generally accepted management practice, recent studies have shown it is not effective in all situations. A critical attitude should be taken toward salt as a general management tool until its effectiveness is demonstrated. It is recommended that distribution of salt be limited to elk problems and as trap bait with possible local exceptions. Plans to distribute salt should carry provisions to evaluate effectiveness of salt distributed. Periodic review of salt plans is recommended to determine whether objectives have been accomplished.

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Title of Project: Western Montana Big Game Surveys

Leader: Merle J. Rognrud

Job Completion Report

Job No. III-C

Investigations Project

Title of Job: Evaluation of Artificial Salting and Aerial Salt Distribution

OBJECTIVES:

To determine the effectiveness of artificial salting as a management tool to draw big game away from natural lick area, critical winter ranges and agricultural crop land.

TECHNIQUES USED:

The effectiveness of salt in accomplishing objectives for which it was distributed, was investigated by an extensive survey during the project year. Preliminary plans to evaluate the salting project, focused attention on the complexity of the problem. It was concluded that a rather intensive study over a period of time would be necessary to properly evaluate salt as a management tool. Time, funds and personnel were not available to conduct a complete investigation of salting, but the extensive survey was accomplished to improve understanding of the problem for possible future studies, and to guide the present salting program.

During the project year observations were made, incidental to other work, of use by big game and of salt distributed under project W-26-M. The problem was kept in mind and discussed at every opportunity with field personnel of the Department and the U. S. Forest Service, who had been previously advised of the nature of the investigation. These observations and discussions revealed more aspects of the problem and added to the general understanding of salting. Some salt drops were checked from airplanes to determine whether salt was used by big game.

A limited amount of salt was distributed in an experiment to learn any seasonal attractiveness of the compound. An attempt was made to determine whether salt affected elk distribution as shown by trends in harvest on adjacent similar ranges. Some observations were made on the relative stability of different kinds of salt exposed to weathering in the field.

A questionnaire (see following pages) was used to learn general field experiences with salt as a management tool. Since preliminary work showed most salting objectives were to influence elk a majority of the questions considered only that species.

Local objectives of distributing salt were learned and recommendations of how salt should be used were obtained by this method. Analysis of the 60 questionnaires also gave additional background to prepare the 1955 salting plan.

It was necessary to lean heavily on a review of literature to evaluate the salting program. Since adequate field investigations could not be undertaken, an attempt was made to interpolate some findings of recent work, particularly in Oregon (Barron 1953, Black 1955), to Montana conditions. The limitations of this kind of approach to the salting problem is understood.

The need for information to guide distribution of salt was great and it was felt the Montana program could benefit by a digest of work in other areas. Certain basic principles are involved in using salt and the knowledge to date should be applied in the field. The literature, findings of the survey and the questionnaire were considered in preparing this report and recommending a tentative guide to the distribution of salt.

SALT DISTRIBUTION

Name _____ Ranger District or Residence _____

1. Has game salt been distributed in your area or ranger district?

Yes _____ (most recent year _____) No _____ (if no go to next page)

2. What are the reasons for distributing salt in your area? (If uncertain of reasons indicate the most probable with question mark(?) in appropriate space.)

- a. Influence movements and distribution of: elk _____, mule deer _____, white-tailed deer _____, mountain sheep _____, mountain goats _____, moose _____, livestock _____.
- b. Lessen utilization of winter ranges _____.
- c. Attract big game away from natural licks _____.
- d. Lessen game damage to cultivated crops _____.
- e. Attract big game onto formerly unoccupied ranges _____.
- f. Replace livestock salt used by big game _____.
- g. Other uses _____.

3. Has the present distribution plan been effective in accomplishing the above mentioned uses of salt?

Yes _____ No _____ Partly _____ (Use reverse page for any comments.)

4. What are your recommendations for any future distribution of salt in your area?

SALTING QUESTIONNAIRE

1. What one season does salt seem most attractive to big game:

Winter____, Spring____, Summer____, Fall____

2. What are the months that you have actually observed big game using salt:

Jan.____, Feb.____, Mar.____, Apr.____, May____, June____, July____,
Aug.____, Sept.____, Oct.____, Nov.____, Dec.____.

(Rate: 1-heavy, 2-moderate, 3-light, 4-none, 5-no observations)

3. What site do you feel would be best to establish a salt lick:

Ridge top____, Saddle or Pass____, Slope____, Creek Bottom____,
Other_____
(Specify)

(Please give reasons on reverse side of this page.)

4. Do you feel big game learn the location of salt licks:

Yes____ No____ No opinion____

5. What is the greatest distance you feel that elk would travel to an established salt lick: 1 mile or less____, 1-2 miles____, 3-5 miles____, 5 miles or more____.

How far might mule deer travel: 1 mile or less____, 1-2 miles____, 3-5 miles____, 5 miles or more____. No opinions____.

6. Do you feel that concentrations of elk on the summer range could be moved by salt?

Yes____ No____

Could elk be moved with salt on the winter range?

Yes____ No____ No opinion____

7. Does salt appear to be more attractive to big game on some ranges than other ranges?

Yes____ No____ No opinion____

8. Have you observed any change in utilization of winter range areas as a result of big game salting in your area?

Yes____ No____

Change in distribution on summer range? Yes____ No____

Change in distribution on winter range? Yes____ No____

No observations_____.

9. Do you feel big game movement off the winter range is hastened by salting upper winter range and/or lower summer range?

Yes_____ No_____ No opinion_____

10. Do you feel salt is effective in reducing damage to:

Cultivated crops - Yes_____ No_____

Natural lick area- Yes_____ No_____ No opinion_____

Please discuss your ideas as to the relative importance of locating salt licks with respect to the following range features to obtain a more desirable seasonal distribution of big game (elk) and to lessen utilization of their winter ranges: (1) topography (ridge, saddle, basin, slope, bench, stream bottom), (2) vegetative types (timber, burns, meadows, brush), (3) travel routes (migration trails, ridge tops, passes, etc.), (4) feeding areas (meadows, open slopes, burns, logged areas, timber edge, etc.), (5) or how should salt be placed in the field to accomplish the above objectives.

Please discuss whether you feel it is important to have a salt lick used year after year, rotate the location of salt licks, or change salt lick location each year to accomplish the above objectives of salting big game.

If you have ever found salt not used by big game would you please discuss the circumstances (location and, with respect to topography, vegetative type, feeding areas, etc.).

FINDINGS:

Introduction:

Salt has long been recognized as an important aid to managing livestock on western range. When big game increased sufficiently to create problems of mal-distribution and over-stocked range, salt was used in an attempt to obtain a more desirable utilization of the forage resource. Experience with salt on livestock range guided the distribution of salt for big game ruminants.

In 1953 the eleven western states except Nevada, were distributing salt in varying quantities and for several different purposes (Black 1955). The present salting program in Montana began in 1942 when 6 tons of salt were distributed in the Sun River, primarily to counteract the influence of natural licks (Cooney 1951). Prior to 1942, some salt had been distributed for big game by the U. S. Forest Service (Anderson and West, 1941).

The use of salt on big game ranges in Montana increased after the program began in 1942. In 1951, a total of 80 tons (Cooney 1951) was distributed for big game. Evaluation of the amount of salt distributed in 1954 ($72\frac{1}{2}$ tons) showed considerable inequity in the allotment of salt among the management areas, when the amount of salt was related to the estimated numbers of big game in a given area (Rognrud 1955). Adjustments in the distribution of salt were recommended and accomplished in 1955 as a result of the evaluation of this aspect of the salting project. W-26-M.

The use of salt as a management tool gradually became more or less accepted practice after years of salting the big game ranges. Some reports on the use and effectiveness of salt, based on general field observations and experience, have discussed salting as a desirable practice (Anderson and West 1941, Biladeau 1946, Case 1938, Gallaher 1938, Cooney 1951). However, other recent investigations of the use of salt on deer ranges have shown that salt was not effective in accomplishing the purposes for which it was distributed (Leopold et al 1951, Interstate Deer Herd Committee 1954, Barron 1953, Black 1955).

It appears that it will be difficult to evaluate the salting program. After the distribution of salt in western Montana over a period of 12 years, it is very likely that an acquired taste for salt is quite prevalent among big game in the region. Although areas without a past history of salting are available, other variable factors in the field tend to complicate any evaluation of salt as a management tool. Since a long-time investigation of the problem was not possible, the present evaluation of salting attempted to clarify objectives of the program, to establish certain facts in salting big game and to provide a tentative guide and recommended policy for any continuation of the salt distribution program.

Objectives of Salting:

Clarification of the objectives of salting appeared basic to determining whether salt plans were accomplishing the purposes for which they were developed. A review of the literature and 60 questionnaires on salting, showed a number of reasons for distributing salt to big game animals. Nearly all objectives depended on salt to influence movements of big game. The most common objective was to lessen utilization of winter range forage.

The primary objective of salting was implied by a number of statements: to hold game off the winter range for a longer period of time, to attract game off the winter range earlier, to retard fall migration and hasten spring migration, improve seasonal (winter) distribution of game or break up seasonal (winter) concentrations of big game, to attract game to formerly unoccupied winter range, or attract game to under-stocked winter range, to attract game away from natural licks located on winter range.

A list of salting objectives is given below:

1. To lessen utilization of winter range forage.
2. To lessen damage to range in vicinity of natural licks.
3. To lessen damage to cultivated crops and private property.
4. To attract big game to formerly unoccupied range.
5. To improve seasonal distribution of big game by breaking up concentrations of animals or attracting to understocked range.
6. To establish a desirable pattern of forage utilization on livestock range by holding game off livestock allotments or attracting game to local areas not used by livestock.
7. To attract big game for some management purpose (trapping, transplanting, census, harvest, etc.).
8. To lessen accidental loss of big game due to highways, railroads or other artificial hazards.
9. To maintain favorable public relations by replacing livestock salt used by game, as a popular gesture in handling complaints of game damages as well as using a generally accepted game management practice.
10. To supply a need or requirement of salt or nutritional supplement of mineral to big game ruminants. (Not in accord with the present trend of knowledge of salting but is a question which remains to be answered by basic research).

Animal Characteristics to be considered in Salting:

Salt Requirements

A certain amount of salt is vital to normal physiological processes of animals but the requirement for salt is small. The salt requirements of domestic animals have been studied and were

reviewed by Black (1955), who pointed out that salt is undoubtedly required but whether supplemental salt is necessary remains a question. Murie (1951) suggested the physiological requirements of game may not be the same as domestic animals and questioned the need of free salt. Murie (1951) wrote: "The normal food supply of elk undoubtedly contains the various mineral salts in quantity sufficient for the animals physiological needs." Bissel and others (1955) showed no craving for salt by deer after being deprived of salt for 30-80 days in a California feeding experiment. Nichol (1938) found deer consumed twice as much salt in the summer as in the winter season. Elk consumption of salt was negligible in a western Montana winter feeding experiment (Geis 1954).

The theory that free salt is not required by big game ruminants is borne out by the abundance of these animals in America prior to civilization. The use of natural licks in some regions was known to occur before settlement (Dixon 1939, Murie 1951) and still occurs in some localities, but big game also abounded in regions where natural licks were not found (Murie 1951). Natural licks have generally been found to contain a higher than normal occurrence of minerals which appears to be attractive to big game ruminants. Stockstad (1953) in a study of characteristics of natural licks, found sodium compounds prevalent and suggested big game ruminants were utilizing natural licks to obtain sodium. In the light of present knowledge, the use of common salt appears to be justified to counteract the attractive power of natural licks (Stockstad 1953).

The idea has been expressed that forage on some ranges may not contain the salt requirement of big game ruminants. The presence of natural licks on some big game ranges has been interpreted as an indication of insufficient minerals in the forage to meet physiological requirements of the animals. Since the mineral requirements of big game ruminants are not known, a comparative analysis of the mineral content of forage on ranges where natural licks are found and are absent, would not demonstrate whether the mineral needs of the animals were or were not being supplied. However, such a study may supply more information for the question of why natural licks are found in some areas and not in others.

It is suggested that the attraction salt and natural licks have for big game particularly in the spring may be a partial expression of a depraved appetite due to malnutrition on the winter range. It is known big game often survive the winter in poor physical condition. Animals in a weakened physical condition exhibit abnormal behavior to the extent of a lack of fear for man as well as abnormal appetites. The attraction of salt continues during the summer when the animals have apparently recovered their physical condition, but could the acquired taste for salt then be operative during the latter season? The question might be asked whether the acquired taste for salt is carried over from fall to spring, whether a depraved appetite

results in renewal of the salting habit, or whether a craving for minerals merely occurs annually in some areas.

Supplemental Salt Habit Acquired:

Big game ruminants acquire the taste for salt. Murie (1951) reported game are not at first attracted to salt. The study of salt consumption by deer in Oregon (Black 1955) showed increased use of salt each year the study was in progress. Black (1955) suggested that salt consumption probably reflects the degree that deer have acquired the salt habit.

Season of Use

Big game have been observed to use salt all months of the year in Montana. However the amount of salt consumed apparently varied seasonally. Heaviest use of salt was reported in the spring season during May and June. Moderate use of salt occurred during July and August. Light use was observed during the fall months of September, October and November. Very light use of salt was reported during the winter and early spring months. Local variations in the consumption of salt apparently occurred. It appears that if salt is to be used, it has greatest attractive power during May and June generally, and this period may be considered the "influence season."

The seasonal use of salt is also reported in the literature. Barron (1953) reported deer consumption of salt decreased after August 15 and that a decreasing demand for salt was shown on dry range areas during the summer. Heaviest use of salt occurred during May until mid-June in central Oregon. Black (1955) reported salt consumption by deer may be expected to fall off sharply after initial availability in the spring.

In contrast to general field observations, salt consumption was correlated with the trend in deer numbers in the area salt was distributed, and no change in the seasonal rate of consumption, (after initial availability of salt) was found in central Oregon (Black 1955). Black reviewed Young and Robinette (1938) who reported elk made most use of a lick in the Selway region during June until mid-July and that salt on the summer range would be of doubtful value in lengthening the fall grazing period. It appears that the seasonal drift of game may occur regardless of salt availability and that observed different seasonal consumption of salt may be effected by game movements as well as by possible changes in the rate of consumption.

Season of Use Experiment, Upper Bitterroot River, 1953-1954

A typical game range in the Sula District was selected for observations on seasonal use of salt. In December, 1953 five 50 pound blocks of salt, (one each of plain white, sulphurized, iodized, trace mineral and calcium phosphate) totaling 250 pounds were placed on the upper limits of a local winter range. In mid-April, 1953

the remaining salt was moved about three miles up the ridge to an area considered to be fall and spring range. Most big game had drifted from the original placement area early in April. Monthly observations of loss in weight of salt were as follows:

<u>Month</u>	<u>Relative Amount of Use</u>	<u>Species</u>	<u>Pounds of Salt Remaining</u>
Jan.	Light	Deer	240
Feb.	Light	Deer	230
Mar.	Moderate	Deer & Elk	215
Apr.	Moderate	Deer & Elk	180
May	Heavy	Deer & Elk	135
June	Heavy	Deer & Elk	90
July	Moderate	Deer & Elk	55
Aug.	Light	Deer & Elk	45
Sept.	Light	Deer & Elk	40
Oct.	Light	Deer & Elk	35
Nov.	Light	Deer & Elk	35
Dec.	Light	Deer & Elk	25

Seasonal loss in weight of salt due to consumption by deer and elk (some weathering included) was 56 per cent in the spring (April, May, June), 23 per cent in the summer (July, August, September), 5 per cent during the fall (October, November, December), 16 per cent during the winter (January, February, March). Seasonal trend in elk and deer numbers within a two mile radius of the salt placement was estimated to be: Spring - 150 elk, 100 deer; Summer - 50 elk, 75 deer; Fall - 35 elk, 50 deer; Winter - 250 elk, 200 deer. Unfortunately, a check of the weathering loss of salt was not made but a weathering experiment (McDowell 1946) in a similar area showed the winter weathering not to exceed 20 per cent and the spring weathering about 10 per cent. A definite low consumption rate was indicated for the winter season and a low consumption rate appeared to exist in the fall, but the high spring and summer consumption of salt may have been correlated with trend in numbers of big game in the salt lick area.

Salt appears to have a generally attractive power during the winter season. Other factors such as snow depth, exposure and forage availability operate to influence movements of game on most winter ranges. Field observations and general experience reported by the questionnaire, indicated elk were not moved, or their distribution changed on winter range by salting.

An exception to the apparent low winter attraction of salt was reported on the Sun River elk winter range. The game range located along the foothills usually does not have snow conditions to inhibit elk movements appreciably. Salt distributed on this winter range was used sufficiently for it to be considered an important factor in effecting a desirable distribution of animals on the winter range and to counteract the power of livestock salt left on adjacent cattle ranges. Prior to the distribution of salt on the

game range some elk bands traveled directly from the foothills to livestock salting grounds. Although these reports tend to show salt may be used appreciably during the winter season in the Sun River area, more observations are needed to confirm the situation.

Consumption Rate of Salt

No work was accomplished in Montana on the rate of salt consumption by big game ruminants. However, a salt allowance of 2 to $2\frac{1}{2}$ pounds per animal unit month has been recommended for cattle on succulent feed, and the remainder of the season, an allowance of 1 to $1\frac{1}{2}$ pounds was recommended (Chapline and Talbot 1926). Observations of salt consumption by range cattle in central Oregon (Black 1955) showed .84 pounds per animal unit month were used. Sheep used slightly less salt than cattle.

Nichol (1938) reported deer consumed .10 pound of salt per summer deer month and $\frac{1}{2}$ that amount during the winter season. The consumption of salt by deer in central Oregon (Barron 1953, Black 1955) increased from .23 oz. to .54 oz. per deer visit to salt licks over a three year period. Assuming deer made a daily visit to the salt lick over a month period, the amount of salt consumed per deer month would range from .43 pound to about 1 pound. This would be equivalent to 2-5 pounds of salt per animal unit month.

It appears unlikely that deer would visit the salt lick daily. An average monthly salt consumption rate probably would be less than indicated by the above report. On the average, a deer was found to consume $\frac{1}{4}$ ounce of salt in 11.7 minutes while visiting a salt lick (Black 1955). It would be desirable if marked animals could be used in learning the frequency of deer visits to a salt lick.

Although Black (1955) reported no spring and summer difference in the rate of consumption of salt by deer, a heavy initial use of salt was noted when it was first made available. General field observations have tended to show a higher spring season consumption of salt, but this problem has not been studied intensively in Montana. The rate of consumption may reach a sudden peak in the spring and gradually decline through the summer season to a low in the fall and winter. Also, the consumptive rate may remain constant but frequency of salt lick visits may decline as the seasons progress, to result in the apparent heavy spring consumption of salt.

Field Observations on Use of Salt Licks

During the field seasons of 1953 and 1954 a total of 40 aerial salt drop sites were inspected and in 1955 general observations on the use of salt were reported by 60 questionnaires on the salt evaluation problem. Results of these observations showed that all species of big game ruminants in western Montana will use salt when it is available and found by the animals. Instances of salt not being used by big game were reported, but the salt placements were located on

high rocky ridges in heavy down timber, some other locality not frequented by big game or with few animals present.

The salt lick frequently could be located from the air by the appearance of trails radiating from the site. Depending on the relative number of animals using the salt lick, the site was trampled in areas of different size, with the salt blocks consumed and weathered to a varied degree. When salt was completely consumed, holes were licked in the ground at the place salt had been. Evidence of animals loafing and feeding in the salt lick area was also found.

In the Bitterroot area, twelve 200 pound air drops made in May 1953 were examined periodically during the following year. It was estimated 44 per cent of the salt had been used by big game, 39 per cent of the salt had weathered, 15 per cent of the salt was used by livestock and 2 per cent of the salt remained after one year. Ten, 100 pound aerial drops made in June 1954 following a revision of plans to not drop on livestock range, were visited over a 4-6 month period after placement. It was estimated 70 per cent of the total salt was used by big game, 15 per cent of the salt had weathered, and 15 per cent of the salt remained.

Salt in Relation to Big Game Mobility and Movements

All objectives of salting depend on the attractive power of salt to influence movements of big game. Artificial licks are created or natural licks are supplemented with salt in strategic locations to obtain the desired effect.

Of paramount importance to a salt plan is the mobility of the species, its individual territory and movement patterns. Although big game animals travel to salt licks, the distances involved in the movement are not well known. Considering habits and mobility of the species, it appears elk may travel farther than mule deer. There is considerable evidence to suggest that salt does not influence movements of deer. These findings may apply to elk in some degree but further investigations are needed to thoroughly evaluate the effect of salt on elk movements.

It has been observed that big game learn the location of salt licks. Natural licks and artificial licks may be located away from food and cover or water, and yet appear to be sought out by big game. Big game travel to these licks from feeding areas, but whether this travel exceeds normal mobility or is away from home territory in the case of elk, is not understood. Mountain goats appear to travel away from home territory and normal cliff habitat, to visit salt licks. Again, the salt lick may be included in the home territory of the goat.

Studies on the use of salt by mule deer have shown salt was used by deer in whose home territory it was distributed and that salt did not induce any general redistribution of deer (Leopold et al 1951). The natural, seasonal drift of deer in Oregon was not

affected by the presence of salt. In fact Black (1955) showed a decrease in salt consumption at lower elevations was followed by increased consumption at higher elevations, which was correlated with changes in deer numbers and their seasonal movements. The Interstate Deer Herd Committee (1954) reported negative results in attempts to change habitual movements and range of deer, after two years of work on the problem.

The experience with deer tends to suggest that migratory movements of elk may not be influenced by salt. Migratory movements are induced by a number of environmental factors and animal instincts. Movements may be considered a vector of reaction to impulses and influences to which salt may be added. Any desirable influence of salt may be due to a proper combination of local conditions. The use of salt to influence elk movements should be with the understanding of the complexity of the undertaking and limitations of results that may be achieved. It would be desirable to limit the distribution of salt to those situations where effectiveness could be observed.

The question of whether salt placed along the upper limits of winter range or lower summer range (spring, fall range), would hasten movement off the winter range was answered affirmatively by a majority of the questionnaires. However it is reasonable to assume that most big game would not leave the winter range before readiness of vegetation at higher elevational zones. Food habits are known to change when new growth of vegetation begins and in a relatively short time spring forage becomes quite prevalent everywhere within a given zone of elevation. It is possible that forage readiness rather than salt would have the greatest influence on movements of most big game during this critical period. After the short critical period, in which salt may not be effective, a relative abundance of forage soon is present in the winter range zone. A drift of big game from the winter range then would occur, as new forage became prevalent at higher elevations. However, local variations in winter range conditions may result in a different sequence of events to allow a possible influence of salt on seasonal movements.

Movement patterns of a big game herd may be reflected by salt consumption. Black (1955) found a pattern of heavy and light use of salt licks which was established the first year and remained constant over the three year study period. This indicated a pattern of big game movement in drifting between seasonal ranges. Salt did not affect the movement pattern but was consumed in relation to numbers of deer drifting through the influence area of the salt licks. It is suggested that a well planned system of salt licks may be a method of studying big game movements.

Salt in Relation to Miscellaneous Life History Habits

Habitat preferences of big game species must be considered in any salting plan. Pengelly (1954) suggested that salt would probably

have little effect in changing distribution of white-tailed deer. The white-tailed deer preference for cover would preclude any attempt to attract the animals into any appreciable area of open type country. Other species exhibit certain habitat preferences.

Big game are also influenced by seasonal instincts which may be more powerful than the attractive power of salt. Breeding, migration, birth of young are seasonal activities which may overpower any attraction of salt. The needs for food and water probably would also be satisfied in some degree before the animals would be interested in salt.

Differences in food habits of big game species may affect the consumption of salt. The salt consumption is reported to be less when livestock subsist on dry forage (Chapline and Talbot 1926).

Discussion of Animal Characteristics to be Considered in Salting

Considering the life history habits of the different species of big game ruminants and the status of work and knowledge on the problem of using salt as a management tool, it appears that salt may be of questionable value in lessening utilization of winter ranges. The basic problem of over-utilized winter ranges is one of over-stocking with game, which should be solved by hunting until the desired harvest is made. The great hunter demand for elk has resulted in attempts to use salt to improve distribution of these animals on seasonal ranges where over-utilization appears to be more a problem on mal-distribution locally. This objective of salting should be considered a more intensive management practice than is consistent with other phases of management in operation on most elk ranges. Investigations would be necessary to learn whether salt could be used effectively under such circumstances.

Salt may prove effective in certain local situations, but a general distribution of salt is not advisable for the reason it may alleviate a range condition. The use of salt to lessen winter range utilization should be limited to those situations which have been thoroughly investigated.

Present knowledge tends to show that salt is not effective on deer ranges. Although the work with deer suggests the placement of salt on elk range also may not be as effective as originally supposed, differences in mobility and other habits between the species, would seem to warrant further study of the use of salt in elk habitat. Any distribution of salt to influence elk should be well planned and be made with caution, after investigation of the problem to determine whether, where, when and how the salt is to be used.

It has been shown that salt can be used to attract big game away from natural lick areas in some instances. However new artificial licks are created which may result in local range damage. Consideration should be given to a long-time plan of manipulating game away from the natural lick and yet not create new problem areas.

Salt has been used to lessen damage to cultivated crops and private property. Again the problem is one of local populations of big game not being compatible with civilization. The amount of damage appears to be correlated with relative numbers of big game.

Salt could not be used as a substitute for food but if palatable forage is available away from cultivated crops, salt may induce use of forage in the vicinity of a lick. Salt has been used adjacent to crop damage areas as a means of maintaining favorable public relations. The use of salt to lessen crop damage seems to be of doubtful value except as a temporary measure with public relations value, but salt may be proven effective to counter crop damage under certain local circumstances.

The effectiveness of salt in attracting big game to unoccupied range or improving their seasonal distribution has been negative in the case of deer. General field observations in Montana have reported some success with attracting elk to unoccupied range and improving their distribution. However the problem has not had sufficient study to evaluate the effect of other factors upon elk distribution. The force of population pressure is known to cause changes in occupied range, and changes in environment, involving food and cover, also have resulted in different distribution of game.

More work is needed to determine whether salt can influence elk distribution generally. The lower attractive value of salt in the winter season and the effect of snow and forage availability upon elk distribution would in most cases eliminate salt as an influence during that season.

The possibility of salt effecting a desirable pattern of forage utilization on livestock range needs investigation. A pattern of salt consumption correlated with deer distribution and movements was found in Oregon. Particular attention would have to be given to salt availability on livestock ranges; a possible pattern of use by game of established livestock licks, as well as numerous other local factors. Considering the general prevalence of game in most suitable habitat and the patterns of distribution and utilization already in existence, it is suggested that changes in total population may be more practical than salt, in accomplishing the desired range utilization.

Salt has been used successfully as bait to trap big game in Montana. The possibility of salt holding transplanted animals in the release area would depend on the local situation.

When game is attracted to or crosses highways and railroads to visit a lick, salt may be effective in lessening mortality. However, it appears doubtful that salt would have much influence in lessening game crossing to feeding areas, water or migrating to seasonal range. Salt would also have low attractive value during the winter season when much of this mortality occurs.

Evidence is available to show that big game ruminants probably do not require free salt. Any distribution of salt for the reason of supplying a requirement would therefore not appear justified.

In general it appears that a more critical attitude should be taken toward the general distribution of salt as a big game management tool. Salt has proved successful for certain specific management objectives and under certain local circumstances, but the effectiveness of much of the salt distributed in the past is questionable. In evaluating the salting program it appears that practically each individual salt lick should be considered for its relative merit in effecting the objective for which it was established.

Habitat Characteristics to be Considered in Salting:

Site Factors

The location of the salt lick with respect to topography, type of vegetation, exposure and elevation may influence consumption of salt and effectiveness of the salt plan. The site chosen for a salt lick should be in harmony with the local objective of salting and conform to a pattern of salting in the area.

Topographical features would influence the location of a salt lick when natural barriers are present to affect movements and drift of game. Ridges and passes are often used as travel routes by game and steepness of slope may prevent utilization of an area by livestock. A relatively level spot may be desirable as a lick location to prevent game from rolling salt down hill. Rock slides and barren peaks may not be used by game. The length of drainages, degree of slope related to horizontal distance and the general lay of the land probably would be considered in planning a pattern of salt distribution.

The type of vegetation is an important influence on the distribution of game. Location of licks with respect to forage and cover may affect the use of salt. Some vegetative types may be used for loafing or as bed grounds and others, as feeding areas. The edge effect between vegetative types as feeding areas may be important in salting. Dense stands of lodgepole pine or down-timber may receive little use by game. The extent and juxtaposition of vegetative types in relation to seasonal range of game would affect movements and in turn be considered in a salting plan.

Exposure would have an indirect effect on salting by its influence on vegetation type and seasonal range of big game. The effect exposure has on life zones and vegetative readiness is understood.

Elevation is probably one of the more important site factors to be considered in salting. The relation of elevation to zones of vegetative readiness and in turn to movements of game is well known. An elevational pattern of salt distribution could be attained by successive calendar date intervals between salt placements. Proper

utilization of allotments in different elevational zones having different dates of vegetative readiness are a goal in range management. Too heavy use of forage when new growth first occurs may damage the range more than grazing later in the growing season. Attempts have been made to overcome the problem of grazing before vegetative readiness in different elevational zones by use of salt.

Use of the Land

Salting objectives may be different and the salt plan could vary according to the use made of the lands. Livestock range would probably require a different plan than an area occupied by big game only. Big game range adjacent to agricultural lands may result in crop damages and use of salt may be attempted to improve the situation. The past history of range utilization by livestock and/or game could result in a range condition which probably would be considered in a salting plan. Whether or not an area was logged or had virgin timber would affect forage availability. The status of conifer reproduction on timber producing lands would be considered in salting. The degree of stocking with big game and past history of salting would be another consideration. The creation of artificial reservoirs, railroads and highways through big game habitat, game preserves, refuges and wilderness areas are other land use considerations.

Some problems in Evaluating the Use of Salt:

Supplemental salt may be regarded as an artificial element in the environment of big game. The animals respond to numerous environmental factors and when salt is among the operating components it is difficult to determine whether salt contributed, or to what degree salt may have been responsible for an observed reaction.

It has been demonstrated that deer acquire a taste for salt (Barron 1953, Black 1955) and this fact possibly applies to other big game ruminants. The relative success of a salting plan if indicated only by use of salt, may actually reflect the degree to which the animals have acquired the salt habit. It is understood, however, that salt must be used to be effective.

The differences in life history habits of big game species create problems in any evaluation of the salting plan. Elk probably have a greater mobility than deer; food habits differ among the species which may affect the consumption of salt, and seasonal instincts may overpower any attractive power of salt.

Local characteristics of the habitat including vegetation, topography and uses of the land may affect consumption of salt. Availability of salt on livestock range, presence of natural licks, nearness to water and other site factors may affect salt consumption. Any change in utilization of over-stocked winter range forage is difficult to measure even if any different use could be attributed only to salt.

Seasonal annual variations in local climate affect weathering of salt, forage growth and distribution of big game to confound a study of the effectiveness of salt.

The selection of comparable study areas is difficult due to local variations in climate, soils, vegetation, topography, land use and history of salting. Further complications in a study area are variable densities and unknown size of big game populations. A pattern of normal animal behavior is difficult to establish without attempting to determine how much salt may affect big game activities.

Since salt attempts to alter behavior of wild animals, some changes may be gradual and necessitate intensive studies over a period of years in order to detect them.

Cost of Salting:

Although the market value of salt is relatively low (up to 2 cents per pound delivered) but the added cost of distribution makes salt worth about 8-10 cents per pound at the salt lick. Each 50 pound salt block is worth up to about \$4-\$5 at the salt lick. Unless salt is effective, the expenditures necessary to carry on a large salting program would not be justifiable.

The cost of multi-engine aircraft rental alone has amounted to about 5 cents per pound in Montana. An estimate of cost to distribute salt on the ground, assuming a full pack string with horse and packer one day, would be about 3 cents per pound. Other expenses, incidental, to ground distribution probably would increase the cost to 5-10 cents per pound of salt. These limited estimates suggest that salting costs are an important consideration in evaluating the distribution program.

Tentative Guide to Salt Distribution:

Introduction

The use of salt has been generally accepted as an important big game management practice. However, recent studies have shown it is not effective in all situations, and suggests that some of the salt distributed in Montana probably has not accomplished the purposes for which it was distributed.

Preliminary work on the problem of evaluating the salting project has shown it to be exceedingly complex, and influenced by many factors in the environment of big game ruminants, present knowledge suggests that the status of each salt plan should depend on observations of its relative merit in accomplishing the objectives for which it was made. Some re-orientation in attitude toward distribution of salt would be desirable and more attention should be given to the preparation of salting plans with provisions for observing effectiveness of salt.

This guide to salt distribution is the result of an evaluation of the salting problem on the basis of a questionnaire survey, a review of literature and limited field observations by project personnel. All available information was considered, in preparing the following tentative suggestions, to guide any future distribution of salt, until more facts are learned about salting.

Recommended Procedures in Distributing Salt:

A plan is necessary to distribute salt effectively. In developing the salting plan, numerous factors should be considered which will be variable depending on the local situation. In order to determine first whether or not to salt, a statement of the problem and objectives should be made. This procedure would clarify understanding of the problem and allow reasoning as to whether salt could possibly accomplish the objective.

If it is decided the use of salt should be attempted, a detailed salting plan should be prepared. The salting plan should give the location of salt licks, amounts of salt, methods of distributing salt, provisions for observing effectiveness of the plan, as well as other local details.

Of particular importance to the salting plan is the provision to observe the effectiveness of the salt distributed. If salt is considered worthy of trial, it should also warrant checking to learn the relative success of the salt plan. This will require time in the field to make the necessary observations. If time is not available, the effectiveness of salt cannot be determined. Therefore, it would be advisable to limit the distribution of salt to the amount of checking which would be possible.

Since studies have shown salt is not effective in influencing the distribution or movements of deer, it is recommended salt be used only on elk problems, except in local situations where experiments may be undertaken or to attract big game for trapping.

Applications for salt to be distributed should be made to the district headquarters of the Montana Fish and Game Department. It is recommended that the form shown on the opposite page be supplied for all salt requests. The use of this form should eventually limit the distribution of salt to those situations where salt is effective. It is recommended that the use of salt be discontinued if its distribution does not accomplish the designated objectives.

Statement of Problem

An evaluation of the local problem would be necessary to prepare a statement. Among the factors considered in a problem statement would be the numbers and life history habits of the big game species to be salted. Use of the land—whether a livestock range, adjacent to cultivated crops, a wilderness area, forest, plantation, etc.

Montana Fish & Game Department

REQUEST FOR BIG GAME SALT

To: _____ Date: _____

From: _____

Area salt is to be used: _____
Warden or Ranger District

Address of Consignee or delivery point

Amount Salt Requested: _____ pounds.

Approximate Delivery Date: _____.

Salt Request Approved by: _____
Date: _____

1. Statement of Problem:

2. Statement of objectives: (Assign number to each for code in salt plan)

3. Give provisions made to check effectiveness of salt plan:
(Report required before next salt request can be approved)

(over)

would contribute to the status of the problem. The relative extent of seasonal range areas, condition of ranges, seasonal availability of forage, past history of salting and the presence of natural licks would be other factors to be considered.

The problem statement should enable a decision of whether or not to use salt. In deciding whether to attempt salting, consideration should be given to other possible solutions of the problem. Recognizing basic issues such as an over-stocked game range, would be important, since adequate harvest would be the simple solution in such a case. Salting may be resorted to as a temporary measure with the understanding that only a limited degree of success may be attained, until other more effective methods of management can be adopted. It is not advisable to use salt just in case "it might do some good" except as a trial effort which is followed by observations to determine effectiveness of the salt plan.

Statement of Objectives

After the statement of problem is prepared, the objective of salting is obvious. Usually a single objective will cover the "why" of using salt. Most of the purposes for which salt would be distributed are listed below:

1. To lessen utilization of winter range forage.
2. To lessen damage to cultivated crops and private property.
3. To lessen damage to range in vicinity of natural licks.
4. To attract big game to formerly unoccupied range.
5. To improve seasonal distribution of big game by breaking up concentrations of animals or attracting to under-stocked range.
6. To establish a desirable pattern of forage utilization on livestock range by holding big game off livestock allotments, or attracting big game to local areas not used by livestock.
7. To attract big game for some management purposes such as trapping, harvest, transplanting, census. (To concentrate animals for harvest or hold game on hunting areas, attract to trap site and hold transplanted animals in release area.)
8. To lessen accidental loss of big game due to highways, railroads or other artificial hazard.
9. To maintain favorable public relations. (Replace livestock salt used by big game, as a popular gesture in handling complaints of game damage use of a generally accepted game management practice).
10. To supply a need or requirement of salt or nutritional supplement of minerals to big game ruminants. (Not in accord with present trend of knowledge of salting.)

The Salting Plan

Numerous, local, environmental factors should be considered in planning the where, when, how and how much to salt. The location

of salt licks should be indicated on a map by consecutive numbers which refer to an attached table giving essential data for each lick (see reverse page of Request for Big Game Salt).

Where to Salt

Planning the location of salt licks is a most important step in developing the salting plan. The site chosen for a salt lick will depend on the objective and field conditions in the distribution area. After considering the problem and possible influences of environmental factors, good judgement is probably the best guide in locating the salt lick.

The relation of topography, exposure and elevation to normal movements of big game, type of vegetation and vegetative readiness would influence location of the salt lick. With due consideration to mobility of the species it may be advisable to locate a salt lick where the forage to be used is found. On livestock ranges it is important to coordinate big game salting with the livestock plan.

Attention should be given to the pattern of salt licks in relation to elevational zones corresponding to seasonal range and vegetative readiness. Big game are known to exhibit patterns of movement and these should be considered in distributing salt.

Tentative locations may be chosen for salt licks with the understanding that changes may be necessary after effectiveness of the site has been observed. A general distribution of salt on a seasonal range is not recommended. Location of the individual lick and the pattern of licks are important to the salt plan, and obviously depend on the problem, objective and local environment.

When to Salt

The date to distribute salt is a local problem. Exposure, local climate, elevation and other factors affect the development of vegetation. The readiness of seasonal forage would probably regulate the time to distribute salt in most instances. Considering the seasonal attractiveness of salt, it appears the spring and summer seasons have greatest possibility of influencing big game. If the plan calls for salting progressive elevational zones, a part of the salt allotment may be distributed on different dates, unless it is all placed at one time to expedite the handling of salt.

Weathering of salt must be considered when salt is distributed in advance of the season of use. Leaching of salt has been found to be greater at higher elevations where more precipitation occurs. Observations have shown that unprotected salt will completely dissolve when exposed during the winter and spring seasons at higher elevations and particularly in areas of deep snowfall.

Salt, leached into the ground may not be found and may be less effective at established licks. Salt dropped in snow will be leached and may be lost in the water run-off. Probably salt should be distributed shortly in advance of the period it is to be used.

How to Distribute Salt

The method used to distribute salt would depend on the local situation. The relative costs of aerial or ground distribution, the amounts of salt to be used and the accessibility of salt licks would be a primary consideration. The cost of multi-engine aircraft rental is about 5 cents per pound to distribute salt. An estimate of costs to distribute salt on the ground would be 3-10 cents per pound. The average salt block at the salt lick may be worth up to \$4-\$5 each.

Less precision is attained by the aerial distribution of salt. When exact location of salt is important to success of the program it would be advisable to place the salt by ground methods. Experience has shown it is difficult to locate some air drops of salt when a considerable number have been made. The effectiveness of salt placed on the ground can be checked with a minimum of effort in searching for the lick.

Salt should be placed in the field in such a manner that it will be found by big game. This is important when big game are not common in the vicinity of the proposed salt lick. Unless the location of a salt lick is known by big game, it is necessary to place the salt so it can be seen by animals in the vicinity. It may be necessary to place salt initially in some temporary location to be found by big game and then the salt may be moved gradually to the desired permanent location.

Amount and Kind of Salt

The amount of salt used in each location should be related to the number of animals estimated in the influence zone of the lick. Deer were found to consume about $\frac{1}{4}$ to $\frac{1}{2}$ ounce of salt per salt lick visit in recent studies carried out in central Oregon by William Barron and Hugh Black. An estimate of a salt allowance for elk would be a maximum of about 2 pounds per head per month. The actual consumption would probably be less for elk since the recommended allowance is $2\frac{1}{2}$ pounds per animal unit month for cattle on succulent feed.

It may be important to estimate the probable consumption of salt and the amount of salt at the lick to have salt consumed in a limited period of time. The availability of free salt may influence the effectiveness of the salt plan. Weathering loss of salt should be considered in the amount of salt to be distributed.

Studies have shown common white block salt to be the most desirable for distribution. No preferences have been shown for special kinds of salt over common salt. White block salt appears to have more weathering stability than trace mineral salts but sulphur salt had most stability. No difference was found in consumption of white block salt and granulated rock salt.

Checks on Effectiveness of Salt

Provisions to check effectiveness of the salt plan are necessary to determine whether salt is accomplishing the stated objectives. Location of salt licks for accessibility may be a consideration when a choice of locations is possible. Tending salt licks periodically may result in more effectiveness of the salt plan. Moving salt when local forage is grazed, may be a method of obtaining a more uniform utilization of the range.

Care must be taken in the interpretation of field observations of the effectiveness of salt. It has been found that consumption of salt is related to the density of local big game populations. It is understood however, that salt must be used to be effective. Field records of numbers of big game movements, distribution, dates and places, range observations, etc., would be helpful in determining the effectiveness of the salting plan.

It is recommended that requests for salt should not be approved more than once unless sufficient observations are made and a report submitted as to the effectiveness of the salt plan.

RECOMMENDATIONS:

1. That a form, "Request for Big Game Salt" be supplied to all applications for salt. The form would require a statement of problem, statement of objective and a salting plan as well as an indication of provisions to observe effectiveness of the salt distributed.
2. Requests for salt be processed by the district game biologist and salt deliveries consigned to the local game warden or an address designated by him.
3. Salting plans be reviewed periodically for revisions or to discontinue salting when distribution is shown to be ineffective.
4. Limit salt distribution to elk problem areas and as bait to trap big game, except possible local exceptions and experimental salt.
5. Future distribution of salt be confined to specific areas in which elk management has been intensified and effectiveness of salt can be observed.

6. Careful attention be given to coordination of big game salting plans with any distribution of salt for livestock.
7. Ground methods of distributing salt in less quantity should be encouraged to enable more checking of salt lick effectiveness.
8. A critical attitude be taken toward any general distribution of salt and the reputation of salt as a general management tool until its effectiveness is demonstrated.
9. Limit the scope of any future investigations evaluating effectiveness of salt to a specific phase of the problem.
10. Continue evaluation of salting project W-26-M by periodic review of salting plans and elimination of any ineffective salt distribution.

SUMMARY:

An evaluation of the salting program in Montana was undertaken to determine the effectiveness of salt as a management tool.

The problem was found to be exceedingly complex with numerous variable field factors as well as salt of possible influence to game which would require intensive study over a period of years to properly evaluate.

An extensive survey of use of salt by field observations, big game questionnaires and a review of literature were the methods used to evaluate the salting program.

In 1953 the 11 western states were distributing salt in varying quantities and for different purposes. Evaluation of the amount of salt distributed in Montana showed inequity among management areas when related to estimated numbers of animals in a given area.

The use of salt gradually became an accepted management practice and was reported successful by some workers. Recent investigations have shown salt is not effective in all situations.

Clarification of salting objectives was considered imperative to evaluate effectiveness of salt. To lessen the use of winter range forage was the most common objective of salting in Montana.

The requirement of salt by big game ruminants is small and is probably contained in the natural food supply.

Natural licks contain minerals. A Montana study showed big game seemed to utilize the licks to obtain sodium and that common salt could be used to counteract the attractive power of natural licks.

Big game acquire a taste for salt. Salt consumption may actually reflect the degree to which the salt habit has been acquired.

Big game will use salt when it is available. Use has been observed during all seasons of the year. Salt appears to have the greatest attraction during May and June of the spring season.

Studies in Oregon have shown seasonal consumption of salt is correlated with local populations of deer and seasonal drift of deer occurred regardless of salt availability.

Studies in Oregon have shown deer will consume about $\frac{1}{4}$ to $\frac{1}{2}$ ounce of salt per visit to a salt lick. The rate of consumption was reported constant during the spring and summer after an initial heavy use of salt when it was first made available in the spring.

Observations of the use of salt in Montana showed most salt licks were used except those located in areas not usually frequented by big game.. Big game learn the location of salt licks.

Objectives of salting depend on salt to influence movements of the animals. Mobility of the species is an important consideration in developing a salt plan. A California study showed salt was used by deer in whose home territory it was distributed. Another California study showed salt was not effective in changing habitual movements or range of mule deer.

The use of salt to influence elk movements should be with the understanding of the complexity of the problems. The regulatory effect of vegetative readiness on game movements suggests salt may be ineffective to induce earlier movements from the winter range.

Patterns of salt lick use were found by the Oregon study to be correlated with drift of deer between seasonal range. A well planned system of salt licks may be a method to study game movements.

Live history habits of big game should be considered in attempting to influence different species with salt.

It is questionable that salt is effective in lessening use of elk winter range forage. The basic problem of over-stocked range and under-harvest is best solved by hunting until desired harvest is made. The use of salt to improve mal-distribution of elk probably should be considered an intensive management practice.

The amount of crop damage appears to be correlated with local big game populations. Use of salt to lessen damage seems to be of doubtful value with possible local exceptions.

Salt has not been effective in attracting deer to unoccupied range while some success with elk is reported in Montana but more work is needed to verify success due to other possible factors which could result in observed effects.

Salt has been used successfully as bait to trap big game in Montana, and to attract game away from natural licks.

A critical attitude should be taken toward salt as a general management tool. Some local cases and specific objectives may be handled effectively by using salt. Evaluation may depend on the relative merit of practically each lick in accomplishing objectives for which it was established.

Location of salt lick with respect to topography, vegetative type, exposure and elevation may influence consumption of salt and effectiveness of salt plan.

Use of the land, whether livestock range, wilderness areas, etc., would influence salting plans.

Some problems in evaluating effectiveness of salt were pointed out. Numerous variable and uncontrolled factors affecting salt use create greatest study problem.

Salt costs $1\frac{1}{2}$ -2 cents per pound delivered. Distribution may cost 3-10 cents per pound to make an average salt block at the salt lick often worth up to about \$4-\$5. Aerial distribution of salt by multi-engine aircraft costs about 5 cents per pound.

A tentative guide to salt distribution was prepared. A plan is necessary to distribute salt effectively.

A statement of the problem is important to decide whether to use salt and to guide preparation of the salt plan.

A form "Request for Big Game Salt" was designed for all applications and requests for salt.

The objectives of salt distribution should be stated in preparing a salt plan.

Location of salt licks indicated on a map with a tabulation of other essential description as essential to the salt plan.

The time or dates to salt is a local problem and is dependent on vegetative readiness and other factors. Probably salt should be distributed shortly before anticipated use to minimize weathering loss.

Aerial and ground methods may be used to distribute salt. Costs, precision of location and opportunity to check effectiveness of salt would guide choice of distribution method.

The amount of salt to be distributed should be related to the estimated number of animals in the influence zone of the salt lick and the desired active period of the salt lick.

Provisions to check effectiveness of a salt plan are necessary to learn value of salt as a management tool. Care must be taken in interpretation of field observations of effectiveness of salt.

Submitted by:

Name Merle Rognrud

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

REFERENCES AND LITERATURE CITED

- Anderson, I. V. and R. M. West. 1941. The distribution of salt for game animals. USFS, N. Rocky Mt. Region Field Notes on Wildlife 2(7): 4 pp.
- Barron, William D. 1953. Use of salt in managing mule deer and domestic animals on range lands of central Oregon. Master's thesis, Oregon State College, Corvallis. 76 pp.
- Biladeau, T. D. 1946. Salting in big game management. Proceedings of 26th Annual conference of Western Ass'n. of State Fish & Game Commissioners. pp. 73-75.
- Bissel, Harold D. et. al. 1955. The digestibility of certain natural and artificial foods eaten by deer in California. Calif. Fish & Game. 41(1): 57-78.
- Black, Hugh C. 1955. Salt use by mule deer in the Dechutes National Forest of central Oregon. Master's thesis, Oregon State College, Corvallis. 143 pp.
- Buss, Irven O. and Frank H. Hurbert. 1950. Relation of moon phases to the occurrence of mule deer at a Washington salt lick. Jour. Mamm. 31(4): 426-429.
- Case, George W. 1938. The use of salt in controlling the distribution of game. Jour. Wild'l. Magm't. 2(3): 79-81.
- _____. 1938. The use of salt in sparing winter range in the Selway. Univ. of Idaho Bulletin. 33(22): 27-29.
- Chapline, W. R. and M. W. Talbot. 1926. The use of salt in range management. USDA Circular 379, U. S. Gov't. Printing Office, Wash., D. C. 32 pp.
- Cooney, Robert F. 1951. Salt as a management tool. Proceedings of the 31st Annual Conference of Western Ass'n. of State Fish and Game Commissioners. pp. 99-105.
- Cowan, I. McT. and V. C. Brink. 1949. Natural game licks in the Rocky Mountain National Parks of Canada. Jour. Mamm. 30(3): 379-387.
- Dixon, Joseph S. 1939. Some biochemical aspects of deer licks. Jour. Mamm. 20(1): 109.
- Geis, Anthony F. 1954. The food consumption and relative digestibility of various winter diets fed to elk (Cervus canadensis nelsoni) under controlled conditions. Master's thesis, Mont. State University, Missoula, 68 pp.
- Honess, Ralph F. and Nedward M. Frost. 1942. A Wyoming bighorn sheep study. Wyoming Game & Fish Comm., Cheyenne. Bulletin No. 1, 127 pp.

- Interstate Deerherd Committee. 1954. Eighth progress report on the Devils Garden interstate deer herd and its range. Calif. Fish & Game. 40(3): 259.
- Leopold, A. S. 1951. The Jawbone deer herd. Calif. Dept. Fish & Game, Sacramento. Game Bulletin No. 4, 139 pp.
- Lommasson, T. 1930. The value of salt on alkali ranges in southwestern Montana. Northwest Scientific Ass'n. 4: 74-76.
- McDowell, Lloyd E. 1946. Salt leaching experiment. Federal Aid Project I-R Quarterly Report, April-July. Mont. Fish & Game Commission, Helena.
- Murie, Olaus, J. 1951. The elk of North America. The Stackpole Company, Harrisburg, Pa. and Wildlife Mgm't. Institute, Wash., D. C. 376 pp.
- Nichol, A. A. 1938. Experimental feeding of deer. Univ. of Arizona Technical Bulletin No. 75. Univ. of Ariz., Tucson. 39 pp.
- Pengelly, W. Leslie. 1954. Coeur'd Alene deer management study. Completion Report, Federal Aid Project W-90-R. Idaho Fish & Game Comm., Boise. 213 pp.
- Rognrud, Merle J. 1955. Game range maintenance through salt distribution. Job Completion Report, Federal Aid Project W-26-M. Quarterly Report. Montana Fish & Game Commission, Helena.
- Stockstad, Dwight S. et. al. 1953. Chemical characteristics of natural licks used by big game animals in western Montana. Trans. 18th N. Am. Wild'l. Conf. 247-258.
- Young, V. A. and W. L. Robinette. 1938. A study of the range habits of elk on the Selway Game Preserve. Univ. of Idaho Bulletin 34(9): 48 pp. Univ. of Idaho, Moscow.

STATE Montana
PROJECT NO. W-33-D-6
DATE July 15, 1955
VOL. VI NO. 2

FINAL REPORT

For

DEVELOPMENT PROJECTS

As Required By

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: Blackfoot-Clearwater Winter Big Game Range Development
2. Personnel: Wesley Woodgerd, Biologist, Project Leader
Jack Ray, Junior Fieldman
3. Completion Report:

A. BUILDINGS:

A small hay storage shed and elk trap combination was erected in the Elk Basin area. The shed, of frame construction and roofed with salvaged metal roofing, was designed to hold about 150 bales of hay. The trap, complete with the necessary tagging chutes, was operated this past winter.

B. BIG GAME TRAPS:

Two panel type portable big game traps were constructed. The panels are nine feet high and seven feet wide and are made of 1" x 4" planed boards with 1" x 6" boards around the edges and through the center of each panel for additional strength. Each trap consists of 22 such panels, two framed seven foot gates, two framed 20 inch gates, four tagging chute panels and the necessary iron stakes, trip wires, etc.

C. EQUIPMENT:

Equipment purchased under this project includes:

Hay elevator
Binoculars
1 Saddle horse
2 Work and pack horses

Submitted by:

Name Wesley Woodgerd

Title Biologist

Approved by:

Name Merle Rognrud

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-45-M-4
DATE	July 15, 1955
VOL.	VI
NO.	2

FINAL REPORT

For

MAINTENANCE PROJECTS

As Required By

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Title of Project: Maintenance of Blackfoot-Clearwater Big Game Range

2. Personnel: Wesley Woodgerd, Biologist, Project Leader
Jack Ray, Junior Fieldman

3. Completion Report:

A. BUILDINGS:

Work done under this maintenance and repair item consisted of re-roofing the horse barn with salvaged metal roofing and painting the exterior of the metal garage and the interior of the bunkhouse. Gravel was hauled to level the floors of the hay shed and the garage and a 12 foot wooden wall was constructed across the west end of the hay shed to prevent hay spoilage due to drifting snow. Small miscellaneous repair on other buildings was also carried out under this project item.

B. CANALS AND DITCHES:

All irrigation ditches from their source to the meadow boundaries were maintained and repaired when necessary. The headgates and ditches are now in good repair and require only routine annual maintenance work.

C. ROADS:

The interior roads (about 16 miles) were graded and repaired when necessary to facilitate travel and for use as firebreaks. The snow was plowed from a portion of these roads throughout the winter for access and to enable the elk nutrition study and the elk tagging operations to be carried on.

D. FENCES:

A portion of the horse pasture and meadow boundary fence required considerable maintenance and necessary upkeep maintenance work was carried out on the remainder of the boundary and interior fences.

E. NOXIOUS VEGETATION CONTROL

Control measures used on the leafy spurge area included cultivation of the larger and more accessible patches and chemical spray on the smaller spots, rocky areas and fence rows. Numerous cultivations succeeded in keeping the top growth down thereby weakening the root system. At least one more year of cultivation will be necessary to kill the mature root systems and make practical the planting of grasses to compete with the leafy spurge seedlings.

Four different types of chemical control measures were tried. Polyborchlorate, a soil sterilant, was used both as a spray and dry application. The ester formula of 2-4-D was used and the amine formula of 2-4-D was mixed with Ammate and applied as a spray.

A report on the effectiveness of the various control measures will have to be delayed until the results can be evaluated in terms of re-growth this spring.

About forty acres of heavily infested goatweed area was plowed and summer fallowed. Most of the remaining area was sprayed with the ester formula of 2-4-D applied at the rate of four pounds acid equivalent per acre. Three colonies of goatweed beetles were liberated on heavily infested spots. No other control measures were taken where the beetles were released.

An evaluation of the control measures used on the goatweed infestation must await spring re-growth.

F. GAME BAITING AND TRAPPING:

This phase of the program was handled jointly with Project W-60-R-2 and is reported on under that project.

G. FUEL PROCUREMENT:

Necessary wood was cut and ricked to season for the following year's fuel supply.

H. MISCELLANEOUS ACTIVITIES:

These activities include maintenance and repair of equipment, distribution of hay and grain, general upkeep of the area and necessary

census and patrol work.

Submitted by:

Name Wesley Woodgerd

Title Biologist

Approved by:

Name Merle Rognrud

Title Senior Biologist

Approved by:

Montana State Fish and Game Department

By Faye M. Couey, Ass't Coordinator

Wildlife Restoration Division

STATE Montana
PROJECT NO. W-46-M-3
DATE July 15, 1955
VOL. VI NO. 2

Title of Project: Statewide Maintenance

Leader: Wynn Freeman

Job Completion Report Jobs 1 and 2 Maintenance Project

Title of Jobs: Maintenance of Waterfowl Development Projects
Payment in Lieu of Taxes

Date work was accomplished: April 22, 1955 - May 11, 1955

PERSONNEL: Jack Owens, Senior Foreman
Wayne Rusk, Laborer

PURPOSE:

1. To check and repair fences on all areas
2. To check general cover conditions, waterfowl usage, and water conditions
3. To check areas for trespass stock
4. To include costs of payments in lieu of taxes on P. R. purchased lands

PROCEDURE:

Travel to specific areas was by automobile. Intensive checks of specific areas were made on foot. Needed repairs to fenced areas were made at time of check. Descriptions and locations of areas checked can be found in the "Final Report of the Water Facilities and Wildlife Habitat Development Project 8-D," and the "Broadview Pheasant Habitat Development Project."

ITINERARY:

April 23	BR-8, BR-47, BR-12
April 25	BR-43, BR-52, BR-38 Dodson Dam Area
April 26	PR-161, PR-95, Area #7, Area #8
April 27	VR-9, VR-82, McCone Study Area
April 28	McCone County Study Area
April 29	McCone County Study Area
April 30	Johnson Reservoir, Kubach Res.
May 2	Carter County Study Area
May 5	Soda Creek Res., Melstone Res.
May 6	Broadview Development Project
May 7	Alt Reservoir

May 9	Warhorse Lake, Valentine Reservoir
May 10	Yellowwater Reservoir
May 11	Ackley Lake

FINDINGS AND WORK ACCOMPLISHED:

BR-8: The fence was in good shape. No repairs were necessary. Water level was high. Cover was in excellent condition. A total of 68 ducks was counted.

BR-47: The fence did not need repair. Water and cover conditions were good. A total of 12 ducks was counted.

BR-12: Minor repairs on the fence were necessary. Wire was stretched, and posts were relocated. Cover and water conditions were excellent. One hundred ducks and four geese were counted.

BR-43: Fence repairs consisted of driving a few staples to tighten the wire. The water level was high. Twenty-five ducks were counted on the area.

BR-52: Fence was in fair shape and no repairs were necessary. On the downstream side, near the dam, the fence was under water. Water level was high. A total of 15 ducks was counted.

BR-38: Barbed wire was stretched. Some steel posts were reset and stapled. Water level very high. This condition of excess water seemed prevalent in this area. A total of 12 ducks was counted.

Dodson Dam Area: A few minor repairs were made on the fence. Two broken wires were repaired, and two fence anchors were installed in a coulee.

PR-161: Fence was in very good condition. Water level was high. A count of waterfowl showed 150 ducks and 12 geese. One goose nest was found containing 6 eggs.

PR-95: Fence was down from heavy snow. A few cows had been in the exclosure. The fence was repaired. The water level was high. Vegetation within the area looked good. Fifty ducks were counted on the area.

Area #7: (Milk River) Repairs were made to wire gates and fence along the ditch, cattle were getting under the fence.

Area #8: (Milk River) Three gates were repaired and wire spliced on the fence.

VR-9: Some stock had been in the area during the fall. Minor repairs were made to the fence. Water level was high. The new jet air base runways connect with this fenced area.

VR-82: Fence was in good condition and did not need repair. Sixty ducks were seen in the area.

McCone County Study Area:

Area #6: The fence needed repair. Eight steel posts were used and wire stays installed between posts. Water level was fair. Two ducks were seen on the area.

Area #7: A total of 8 steel posts and 20 rods of barbed wire was used in fence repair. Waterlevel was low. Seven ducks were counted on the area.

Area #28: The dam has been rebuilt and water level raised six feet. The farmer had removed the fence and stored it to save the material.

Area #26: The fence was in good condition. The farmer is going to rebuild the dam and this may necessitate removal of fence from this area. The fence can be reconstructed at a higher level if this is deemed necessary.

Area #11: Six steel posts were used in repair of fence. Wire stays were placed between posts all around the area. Six ducks were counted on the area.

Area #12: The fence was in need of some repair; three steel posts and ten rods of barbed wire were used. Wire stays were placed between posts around the area. Two sharp-tailed grouse were seen on the area. No ducks were observed.

Area #9: Four steel posts and five rods of barbed wire were used to repair the fence. Wire stays were placed between posts all around the area. Twenty-five ducks were counted.

Johnson Reservoir: The fence was in need of some repair. Three steel posts and some wire was used to make the repairs. The dam shows signs of washing away for one hundred feet along the face. Water conditions were good. One hundred ducks were counted.

Kubash Reservoir: One steel post was set and the wire was set and wire was stretched on the east side of the reservoir, water and cover conditions were good.

Carter County Study Area:

Area #44: Stay wires were placed between the posts. Two steel posts were set and the barbed wire was stretched. Cover and water conditions were good. No ducks were seen on the area.

Area #14: Stay wires were placed between the posts. Two ducks were seen in the area.

Area #12: Fence repairs consisted of placing stay wires between posts and the setting of two new steel posts. Two ducks

were observed.

Area #9: Wire stays were placed between the posts on the fence. Four ducks were seen in the area.

Area #7: No fence repairs were necessary. Water and cover conditions were good. Five ducks were seen on the area.

Area #1: Two wire stays were placed between posts on this area. Cover and water conditions were good. A total of six ducks was observed.

Soda Creek Reservoir: The fence was in good condition. A few staples were driven in order to tighten the wire. One hundred and fifteen ducks were counted.

Melstone Reservoir: The fence was in good condition and did not need repair. Cover and water conditions were good. Thirty ducks were observed.

Broadview Development Project:

Don Eastman Reservoir: The fence was repaired across the water. Six anchor posts were set. Water and cover conditions were good. Four ducks were using the area.

Connover Reservoir: The heavy snow had broken the fence down along the north boundary. Necessary repairs were made. Water and cover conditions were good. Twelve ducks were observed.

Lehfeldt Reservoir #1: The wire was stretched and minor repairs made to the fence.

Lehfeldt Reservoir #2: Fence was in poor condition. Two new corners were set. Steel posts were reset along east side and wire was stretched. Six ducks were observed.

Alt Reservoir: The fence was in a fair condition of repair. The wire was stretched and restapled on entire area. Thirteen ducks were counted.

Warhorse Lake: The fence was restapled and four steel posts were set. Water condition was good. Cover condition was fair.

Valentine Reservoir: Cattle had been in the enclosure. Fence was broken down from the heavy snow. Twelve steel posts and approximately forty rods of barbed wire were used on fence repair. Water condition was good with the water level high. There were about fifty ducks using the reservoir.

Yellow Water Reservoir: The fence was repaired at the water edge on both sides of the reservoir. The water anchor was reset. The wire was stretched and stapled. The old fence on

the west side was removed and salvaged. The water level was low due to irrigation from this reservoir.

Ackley Lake: The fence was down along the north boundary. Six steel posts, six wood posts and about thirty rods of wire were used in fence repair. Wire was stretched and the fence restapled over the entire area.

Weather and water conditions during the entire inspection trip made travel slow. Two areas were not visited because rural conditions made travel impossible. These areas will be inspected during the next fiscal year.

Payments in Lieu of Taxes:

Payments were made for 1954 to counties involved and are here listed by projects.

11-L	Judith Game Range	\$ 239.82
12-L	Gallatin Game Range	281.30
	(this includes \$3.70 penalty and int.)	
25-L	Sun River Game Range	1,091.79
	(includes \$17.88 penalty and interest)	
30-L	Blackfoot-Clearwater Game Range	1,975.05
34-L	Milk River (Dodson)	32.05
	(includes \$.43 penalty and interest)	
48-L	Muddy Creek	61.96
	(includes \$.81 penalty and interest)	
51-L	Fox Lake	40.92
	(includes \$.54 penalty and interest)	
52-L	Ninepipe	1,986.37
	(includes Ainsworth Island)	
53-L	Goose Islands (see 52-L)	
54-L	Freezout	148.89
	(5/12 of '53 tax includes \$11.88 penalty and interest)	
	('54 tax includes \$13.02 penalty and interest)	988.33
64-L	Bull Mountain	37.57
	This is last half as per option	
	Total paid for year	\$6,884.05

Because of delay in the Attorney General's office these payments were delinquent. Following the Attorney General's opinion that the State cannot pay penalties, counties were notified and they agreed to refund the penalty or make an adjustment on the 1955 tax.

Prepared by:

Approved by:

Names Wynn G. Freeman and
Faye M. Couey
Title Ass't Coordinators

Montana State Fish and Game Department
By Robert F. Cooney, Coordinator
Wildlife Restoration Division

STATE	Montana
PROJECT NO.	W-63-M-2
DATE	July 15, 1955
VOL. VI	NO. 2

FINAL REPORT

for

MAINTENANCE PROJECTS

As Required by

FEDERAL AID IN WILDLIFE RESTORATION ACT

1. Name of Project: Maintenance of Judith River Game Range

2. Management Plans:

The game range headquarters was maintained as a base from which survey, investigational work, game herd manipulation, trapping, game range maintenance, salting and other operations were carried out.

Buildings, roads, boundary fences, fields, equipment and other improvements were maintained.

4. Project Supervisor: Don L. Brown, Unit Biologist

Project Leader: Bert Goodman, Junior Fieldman

5. Buildings:

a. Buildings and improvements shown on Project W-43-D-3 were maintained. Some maintenance work was done on the Kempf buildings which are to be used in various phases of field and investigational work.

b. Type of maintenance:

Included general repair, painting and maintenance of necessary buildings, and the removal of undesirable buildings from the area.

The range headquarters building was insulated, using Zonolite and balsam wool blanket insulation. The upstairs east room was covered with 5/8" sheet rock left over from the remodeling under W-43-D-3. Kitchen cupboard, cabinets, mop boards and moldings were given another coat of paint.

Improvements suggested by supervisors were carried out. This included rewiring of hot water heater, placing chrome rings and trim

about the kitchen sink and cabinets, chrome guards on exposed edges of linoleum and the building of additional storage shelves in the basement. One 500-gallon fuel oil tank was installed for stove fuel.

Several undesirable buildings were torn down, salvable materials recovered and the rest burned.

The water pump was repaired. The house water tank was improved and a water heater installed to provide water for horses during winter months.

9. Roads:

This consisted of graveling certain muddy spots of the main road, drainage of mud holes, exchanging the entrance cattle guard which was sagging for the exit cattle guard which receives light use.

There was no equipment available to do any blading of the landing strip and road during the project period.

10. Fences:

a. Type of maintenance:

Boundary fences, horse pasture fence and fences about the headquarters were maintained.

The ten and three-quarter miles of boundary fence were maintained, some rotten jacks, broken jacks and poles were replaced. Sections of fence exposed to strong winds were reinforced with steel pins driven into the ground. Several wire gates were replaced with swinging pole gates and additional pole gates built to be used at points of heavier travel.

Several old fence lines were torn down, wire disposed of and the posts piled and burned or used in erosion control work.

13. Signs and boundary markers:

Boundary markers designating management areas were received. Some were mounted on painted plywood backs and placed at all entrances to the Game Range. Others were mounted on plain boards and placed at one-fourth mile intervals along the southern boundary, along with restricted travel signs.

14. Replanting and cultivation of trees and shrubs:

Survival of the evergreens planted was poor. Ponderosa pine shows the greatest promise for survival in this area.

The caragana bushes were trimmed and cultivated and appear to be doing well.

20. Telephone line maintenance:

a. Type of maintenance: General repair

Maintenance of the main telephone line consisted of replacing several

insulators shot off by hunters.

Several posts were replaced and some temporary repairs put into the line between the headquarters and the Kempf buildings.

21. General supervision:

Work consisted of fire patrol and control, trespass livestock control, experimental manipulation of elk and deer in and adjacent to game range and in Middle Fork ranch area, general cleanup and miscellaneous duties.

Fire patrol was carried out after lightning storms and periods of heavy travel. Several small fires were discovered and extinguished.

Checks for possible trespass stock were carried out in conjunction with maintenance activities on the range. There was little trouble of this type.

Experimental manipulation of elk and deer herds on and adjacent to the game range was carried on during the winter and early spring months. This work was done with horses, jeep and afoot. It is felt that some relief to the local ranchers has been obtained by this manipulation.

Some herding was carried out on the private lands located in the Middle Fork of the Judith River. Due to the terrain it was not possible to drive the animals from the area, but it is felt that the constant disturbance of herding did much to keep the elk off private lands.

General cleanup and miscellaneous duties were carried out under this phase of the project.

22. Water right maintenance:

Consisted merely of periodical clean-outs and checking of existing spring.

23. Wood and hay hauling:

Wood hauling and cutting was carried out for the herding camps. For this purpose a chain saw was rented.

Alfalfa hay was hauled from the Fort Peck Bird Farm to the game range. It was used for the baiting of elk and deer traps.

Items purchased and used at range:

- | | |
|--|-----------------------------------|
| 1. 1/4 ton jeep with winch and steel cab | 4. 1 - 30-06 rifle for herding |
| 2. 1 - 500 gallon fuel oil tank | 5. Insulation for house |
| 3. 2 horses | 6. Miscellaneous tools & supplies |

Submitted by:

Approved by:

Name Bert Goodman

Montana State Fish and Game Department

Title Jr. Fieldman

By Faye M. Couey, Ass't Coordinator

Approved by Don L. Brown

Wildlife Restoration Division

Title Sr. Biologist

MONTANA

Fish and Game Commission

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Wildlife Restoration Division

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